WRITING
ACROSS THE CURRICULUM

In the Disciplines and In the Workplace

2026

Lone Star College
Montgomery

INTRODUCTION

PURPOSE AND SCOPE OF THE JOURNAL

Welcome to the twenty-first edition (Fall 2026) of our journal of student writing at Lone Star College-Montgomery: Writing Across the Curriculum (WAC), In the Disciplines (WID) and In the Workplace (Vol. XXI). The purpose of the publication remains twofold: (1) to celebrate examples of discipline, field, and profession-specific student writing from across the college, and (2) to provide students and faculty examples of such writing to use in the classroom.

ORGANIZATION OF THE JOURNAL

The journal is organized by program or discipline and within the latter, by genre or kind of writing important in the field. In this way, the journal showcases students using the same skills and producing the same kinds of writing that faculty and other professionals produce to communicate successfully. We ask the faculty member who submits the writing from his/her class to include a brief introduction to each piece highlighting how the student selection reflects the kind of communication and specific writing skills important in that field or endeavor. The writing included represents a great range of experience and skill on the part of the student-writers.

WHO PUBLISHES THE JOURNAL?

The journal is underwritten by a faculty group, Communication Across the Curriculum (CAC). CAC encourages interdisciplinary and cross-disciplinary faculty dialogue and curricular experiments. It also supports the college's Writing Across the Curriculum Initiative and sponsors the annual CAC Student Presentation Conference.

WHO CAN SUBMIT WORK FOR PUBLICATION?

We publish student writing from both academic and workforce programs in the college. The course instructors select and submit writing on behalf of their students for consideration by the journal. Nevertheless, we encourage students who are interested in getting their work published to let their instructors know in revising and improving their work prior to possible submission by the instructor. It is the instructor, however, who decides whether to submit.

The instructor is the expert in the field. Therefore, the journal editors and advisors wish to emphasize that faculty who submit student writing accept responsibility for guiding the writer not only in the presentation of content but also in the process of revision, editing, and the correct use of the appropriate documentation style. Use of a particular documentation format is related to the discipline, the genre, and the preference of the instructor in each writing task.

WE WISH TO THANK

All the student writers and the faculty who submitted student work, and especially the journal editors, Professors Nathalie Brandes (Geology), Julie Harless (Biology), Nathan Zingleman (Coordinator, The Write Place), Kirk Cochran (English), and Paul Brandes (Consultant, The Write Place) for putting it all together.

The writing consultants of The Write Place, the college's Writing Across the Curriculum-oriented writing center.

The organizers of the annual CAC Student Presentation Conference: Professors Melissa Dennis (English) and Sunny Zhao (Speech Communication).

SPECIAL THANKS

Dr. De' Reese Reid-Hart, LSC-Montgomery President

Dr. Brandy Harvey, Vice President, Instruction

Dr. Kirk Bennett, Vice President, Administrative Services

Instructional Deans: Dr. Roy Turner, David Benzel, Dr. Mischelle Hopper, Dr. Michael Walsh, Dana Morales, Mary Mendoza, and Dr. Kendra Johnson

VERY SPECIAL THANKS

Jackson Freese, WAC Journal Graphic Designer

Linda Samford, Coordinator III, Instruction

Ron Heckelman

INTRODUCTION CONTINUED

CALL FOR SUBMISSIONS, VOL. XXII (2026-2027)

We seek examples of discipline, field-specific and workplace writing for the twenty-first edition of the journal (Vol. XXII) to be published in the summer/fall of 2027. Faculty in all disciplines, professional and/or certificate and workplace programs across the college are invited to submit student writing. Students who would like to submit writing should let their instructor know of their interest. Students will then revise their work under the guidance of their instructors before their instructors submit the writing to the journal. Submissions must be submitted ELECTRONICALLY in Microsoft Word. No PDFs please. Use the one-step submission form which is linked on the following webpage, or via the QR code at the bottom of this page:

https://LSCMontgomeryCAC.com/WAC-Submissions/

All completed submissions include: (1) An online submission form provided at the above link and completed by the instructor. (2) The faculty member's introductory paragraph included in the online form; and (3) a student release form signed by the student-writer. The release is a separate document from the online submission form, and is also available via the link above or QR code below.

The brief introductory paragraph (150-word limit) written by the submitting instructor must include the name and number of the course but most importantly, an explanation of how the submission effectively illustrates a kind of writing, and/or writing skills important in that form of expression in the discipline, field or profession.

Previous editions journal are also available at
https://lscmontgomerycac.com/

E-mail questions to:
Nathalie.N.Brandes@LoneStar.edu
LSC-Montgomery Writing Across the Curriculum
Initiative and The WAC Journal,
c/o: LSC-Montgomery Dept. of English

DEADLINE FOR SUBMISSIONS: MAY 31, 2027

HOW SUBMISSIONS ARE SELECTED FOR PUBLICATION IN THE WAC JOURNAL

The faculty editors of the journal seek to present writing from as many academic disciplines and workplace programs as possible, limited only by the number of usable submissions and space available in the publication. As explained under "Purpose and Scope" and "Organization," the journal is organized first by discipline and then by genre. This is intended to show the variety of genres within a discipline or area, and to assist both faculty and students to use the selections as instructional models if desired.

Generally speaking, The WAC Journal does not include poetry, fiction, drama, photography and art per se. Additionally, it is not intended merely as a collection of assignments or "student writing." The writing published is intended to represent "real" discipline-linked expression and communication, akin to what is found within particular fields as well as professions. Most of the genres included are traditionally associated with specific disciplines; however, we also consider pieces that vary from the traditional forms. Submissions of mixed-genre and experimental writing are welcome.

The journal celebrates writing qua writing and we thus ask each faculty member who submits a piece to write an introduction to it. This introduction, as much as possible, presents the writing as an effective demonstration of discourse in a field and genre, and/or those notable cross-disciplinary skills useful for clear and precise communication. This introduction generally contributes significantly to the editors' and journal readers' understanding of the specific contributions the piece makes in illustrating communication style within a discipline. The faculty intro is not intended to be an introduction to the course or program of study per se.

The degree of revision required after a piece has been submitted is a factor in the selection process. To minimize editorial intervention after a submission has been received, the editors ask the submitting faculty to work with the writer very closely to revise and prepare the piece for submission and consideration. This includes but is not limited to fullness of citations where needed as well as consistent and appropriate documentation style.

A WAC Journal Submission Guide is available at the CAC website to assist both faculty and students with this process. The LSC-Montgomery writing center, The Write Place (G103), is also available for help with all writing matters.

THE WAC JOURNAL ONLINE SELECTIONS

Some writing, especially that with a significant visual component, is available at the journal website. Links and QR codes are provided in the journal for these selections.

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How Climate Change is Affecting Shark Migration and Distribution

Literature Review by
TONI ALBRIGHT

BIOL 1407: BIOLOGY II FOR SCIENCE MAJORS

Toni Albright presents a deep and comprehensive literature review on actual topics related to global warming. In particular, she examines (based on literature data) how the temperature increase affects populations of various shark species in different regions of the World Ocean. What is the most valuable and important in her analysis is that she critically examines what was already done and, on this background, outlines future investigations which could be carried out for better understanding and managing the problems arising. It looks like an excellent plan for her future research!

- Andrei Nesterovitch, Ph.D.

Abstract

Climate change is altering ocean conditions, which is directly affecting many marine animals, including sharks. Rising sea surface temperatures, changes in ocean currents, lowering oxygen levels, and an increase in the frequency of marine heatwaves can and will change where sharks live and when they migrate between those habitats. Sharks are vital to ecosystems, and multiple species migrate long distances to find food, reproduce, or stay within a comfortable temperature range.

This paper reviews recent studies on how climate change is affecting shark migration and distribution. The review focuses on tiger sharks, bull sharks, scalloped hammerhead sharks, silky sharks, shortfin mako sharks, and other shark and ray species (elasmobranchs). Overall, the studies show that some sharks are moving farther poleward, arriving earlier in seasonal habitats, staying longer in warmer areas, and using different depths in the water column. These changes vary by species, but the overarching pattern shows that warming oceans are already affecting shark behavior and habitat use. These shifts may also make shark conservation and even fishery management more difficult in the future.

Keywords: climate change, shark migration, shark distribution, ocean warming, marine heatwaves

Introduction

Climate change is causing major changes in the world's oceans. Ocean temperatures are rising, currents are shifting, oxygen levels are changing, and marine heatwaves are becoming more recurrent (Birkmanis et al., 2020; Hammerschlag et al., 2022; Lubitz et al., 2025; Osgood et al., 2021; Santos et al., 2024; Vaudo et al., Williams et al., 2025). Because the ocean absorbs a large amount of heat from greenhouse gas warming, many marine habitats are becoming warmer over time. These changes can affect where marine animals live, when they migrate, and their ecological relationships.

Sharks are especially important to study because many species are apex predators or very high on their respective food chains. Their movements can affect food webs and thus the homeostasis of ecosystems. Many sharks are also highly mobile, meaning they can travel long distances between feeding, breeding, and seasonal habitats (Birkmanis et al., 2020; Hammerschlag et al., 2022; Lubitz et al., 2025; Osgood et al., 2021; Santos et al., 2024; Vaudo et al., Williams et al., 2025). At the same time, sharks are strongly affected by environmental conditions such as sea surface temperature (SST), food and resource availability, productivity, and ocean circulation (Birkmanis et al., 2020; Hammerschlag et al., 2022; Lubitz et al., 2025; Osgood et al., 2021; Santos et al., 2024; Vaudo et al., Williams et al., 2025).

Most sharks are ectothermic, meaning the water around them influences their body temperature. Because of this, temperature often plays a major role in habitable locations and how they migrate. As ocean temperatures increase, some sharks may shift into cooler waters, move into new areas, stay longer in warming habitats, or change the level of depths they dive into.

Recent research has found clear examples of these changes. Hammerschlag et al. (2022) found that tiger sharks (*Galeocerdo cuvier*) in the western North Atlantic moved farther north and arrived earlier during warmer years. Lubitz et al. (2025) found that bull sharks (*Carcharhinus leucas*) near Sydney, Australia, spent a longer time in their summer habitats as ocean temperatures increased. Osgood et al. (2021) showed that multiple elasmobranch species near Cocos Island responded differently to long-term warming and El Niño-related heat events.

Other studies show that warming can also influence their use of depth. Vaudo et al. (2016) found that temperature impelled the depth at which shortfin mako sharks utilized deeper pelagic waters in the western North Atlantic. Williams et al. (2025) found that silky sharks in the Red Sea used deeper, narrower temperature zones during periods of high sea surface temperatures. Santos et al. (2024) also projected that various hammerhead shark species may lose suitable habitat in some tropical areas and shift toward higher latitudes under future climate change.

Together, these studies show that climate change is already affecting shark migration, habitat use, and distribution. This topic matters because shark populations already face anthropogenic impacts, including bycatch, overfishing, pollution, and negative prejudice. This paper reviews how climate change affects shark migration and distribution, with a focus on migration timing, geographic range shifts, depth use, and conservation concerns.

Literature Review

Effects of Gradual Warming and Marine Heatwaves on Shark and Ray Species

Osgood et al. (2021) studied how long-term ocean warming and short-term warm events affect elasmobranchs near Cocos Island, Costa Rica. The study is important because it shows that not all elasmobranch species respond to climate change in the same way.

The researchers used more than 34,000 records collected over 27 years. They applied generalized linear mixed models, or GLMMs, to compare shark and ray records with SST and the Oceanic Niño Index (ONI). The ONI allowed the researchers to connect the data to El Niño-related warm events. The study included seven shark and ray species and compared how species with different body sizes, movement patterns, and habitat needs responded to warming (Osgood et al., 2021).

The results showed that responses varied across species. Scalloped hammerhead sharks (*Sphyrna lewini*) abundance decreased as SST increased, while tiger shark occurrence increased in warmer conditions. Species also responded differently during El Niño events. This shows that climate change may alter shark and ray communities unevenly, rather than affecting all species equally (Osgood et al., 2021).

Future research should look more closely at why some shark species are more sensitive to warming than others. More studies are needed on how body size, mobility, and habitat preferences affect a shark's ability to adapt to warming oceans.

Ocean Warming and Bull Shark Residency

Lubitz et al. (2025) studied how ocean warming is changing the migration behavior of *C. leucas* along the coast of Sydney, Australia. The study focused on when *C. leucas* arrived at and left its summer habitats, and the sharks stayed longer as water temperatures rose.

The researchers used 15 years of passive acoustic telemetry data recordings. The sharks were tagged, and their movements were registered when they passed underwater receivers. The study also used satellite and in-water temperature data. The authors compared shark arrival and departure dates with long-term warming trends to see whether migration timing had changed over time. The study found that bull sharks were spending longer in their summer habitats and leaving later than in earlier years. Their residency increased by about one day per year during the study period. It was revealed that the warmer water may reduce the cold temperatures that used to signal sharks to leave the area. This longer residency could increase overlap between *C. leucas*, prey, fisheries, and civilians in coastal waters.

Future research should examine how longer residency of *C. leucas* may affect coastal food webs and human-shark interactions. This is especially important in areas where sharks, swimmers, fishers, and coastal development all overlap.

Future Pelagic Shark Habitat in Australia

Birkmanis et al. (2020) examined how climate change may affect suitable habitat for pelagic sharks in Australian waters. Pelagic sharks live in the open ocean, so changes in temperature and ocean conditions can strongly affect where they reside.

The authors used shark records from commercial fisheries, climate model projections, and species distribution models. They compared historical habitat conditions from 1956 to 2005 with projected future conditions through 2099. Sea surface temperature was one of the main environmental variables in the models. The study examined several groups of pelagic sharks, including the family *Carcharhinidae* (silky shark *Carcharhinus falciformis*, oceanic whitetip shark *Carcharhinus longimanus*, dusky shark *Carcharhinus obscurus* and blue shark *Prionace glauca*) and mackerel sharks (shortfin mako *Isurus oxyrinchus*, longfin mako *Isurus paucus* and porbeagle *Lamna nasus*).

The results suggested that suitable shark habitat is likely to shift in Australian waters as ocean temperatures warm. Family *Carcharhinidae* sharks were projected to lose suitable habitat in some areas, while mackerel sharks showed possible habitat increases in other regions. However, results varied across models and species groups. This shows that climate change will likely cause major changes in where pelagic sharks can live, but those changes may not be simple or uniform.

Future studies should include prey availability, fishing pressure, and more detailed environmental data. These factors could make future habitat models more realistic and useful for shark conservation.

Climate Change and Hammerhead Shark Habitat

Santos et al. (2024) investigated how future climate change may affect habitat suitability for three large hammerhead sharks: scalloped hammerhead *S. lewini*, smooth hammerhead (*Sphyrna zygaena*), and great hammerhead (*Sphyrna mokarran*). This study is important because multiple hammerhead shark species are already considered critically endangered by the IUCN in many regions.

The authors used ecological niche models to estimate where suitable habitat may exist under different future climate scenarios. They compared mid-century and end-of-century projections and examined how warming could alter suitable habitat in tropical and higher-latitude regions. The study also compared differences among the three hammerhead species. The results showed that *S. lewini* and *S. zygaena* may lose suitable habitat in many tropical areas. *S. mokarran* showed some initial habitat expansion, but eventually the habitat area also declined under the strongest warming scenario. All three species were projected to shift poleward, meaning toward cooler waters at higher latitudes. These changes could affect migratory patterns, nursery locations, and the usefulness of current conservation areas.

Future research should focus on how these habitat shifts may affect reproduction, nursery habitats, and fishing risk. Hammerhead sharks may need more flexible conservation plans as their suitable habitat changes.

Tiger Shark Range Shifts and Migration Timing

Hammerschlag et al. (2022) studied how ocean warming is affecting the migration and distribution of *G. cuvier* in the western North Atlantic. *G. cuvier* is a large predator that ranges widely, making this species useful for studying how warming may shift the range of highly mobile species.

The researchers combined several data sources, including satellite tagging, long-term fisheries records, and environmental data. They examined how *G. cuvier* locations and migration timing changed during warmer years. They also looked at whether sharks moved outside protected management areas when ocean temperatures were unusually warm.

The study found that *G. cuvier* moved farther north during warmer years and arrived earlier at northern latitudes. Long-term fishing records also showed a northward shift in *G. cuvier* captures over time. These changes suggest that ocean warming is expanding *G. cuvier* use of higher-latitude areas. The study also raised concerns that sharks may move outside some protected areas during warm years, potentially increasing their exposure to fishing.

Future investigations should continue tracking *G. cuvier* behavior and migration over long time periods. This would help scientists' understanding of whether these northward shifts continue and whether management zones need to be adjusted.

Temperature and Shortfin Mako Shark Depth Use

Vaudo et al. (2016) studied the vertical movements of *I. oxyrinchus* in the western North Atlantic. Instead of focusing solely on where sharks move across the indicated area, this study examined how they move up and down through the water column. The authors used satellite tags to record sharks' depth and temperature use. They examined how water temperature affected diving behavior and habitat use. This helped show whether mako sharks avoided certain low temperatures or used deeper habitats when possible.

The study found that temperature strongly influenced mako shark depth use, with colder water, especially below about 15°C, limiting deeper diving behavior. When the water column was warmer, mako sharks used deeper habitats more often. This suggests that ocean warming could change not only horizontal, but also vertical distribution of sharks.

Future research should examine how mako sharks use depth in relation to prey movement, oxygen levels, and the depth of fishing gear. This would help to establish whether changing of depth use increases or decreases fishing risk.

Silky Sharks and Deeper Habitat Use During Warm Periods

Williams et al. (2025) studied *C. falciformis* in the Red Sea and examined how high SST affected their depth use. The Red Sea is already a very warm marine environment, so it is a useful place to study shark behavior under warming conditions. The researchers examined shark depth use across different seasons and compared it with SSTs. They found that *C. falciformis* used deeper and more limited thermal habitats during warmer periods. During the hottest months, the sharks were concentrated within a narrower depth range, roughly 70-100 meters, where temperatures were closer to their preferred range.

This study showed that warming can compress shark habitat into smaller vertical zones. If sharks become concentrated at certain depths, they may become easier for fisheries to encounter. This could create additional conservation concerns in warm regions where sharks already live near their thermal limits.

Future work should study whether this depth compression changes feeding behavior, predator-prey interactions, or fishing exposure in the Red Sea and other warm marine environments.

Discussion

The studies reviewed in this paper show that climate change is affecting shark migration and distribution in several connected ways. The strongest pattern is that warming oceans are changing where sharks occur, when they arrive and leave seasonal habitats, and how they use the water column. However, the studies also show that shark responses vary by species.

One major pattern is poleward movement. *G. cuvier* in the western North Atlantic moved farther north during warmer years, and long-term records showed a northward shift in captures of *G. cuvier* (Hammerschlag et al., 2022). Hammerhead shark distribution models also projected the poleward habitat shifts under future climate scenarios (Santos et al., 2024). This is in accordance with the fact that many other marine species move toward cooler waters as ocean temperatures rise (Osgood et al., 2021).

Another important pattern is a change in migration timing. *G. cuvier* arrived earlier at northern latitudes during warm years, while *C. leucas* near Sydney stayed longer in their summer habitats and left later (Hammerschlag et al., 2022; Lubitz et al., 2025). This means climate change is not only altering the locations in which sharks are found, but also how long they remain in certain places. A longer residency in coastal areas could increase contact among sharks, prey, fisheries, and people.

The studies also show that not all shark species respond the same way to temperature change. Osgood et al. (2021) found that *S. lewini* abundance decreased with higher SST, while *G. cuvier* occurrence increased. This difference likely arises because of species differences in temperature tolerances, dietary requirements, mobility, and habitat preferences. Therefore, it would be quite a simplification to say that all sharks will respond to climate change in one direction.

Climate change is also affecting the depth use of sharks. *I. oxyrinchus* used deeper water more frequently when temperatures allowed it, while cold water limited deeper diving (Vaudo et al., 2016). *C. falciformis* in the Red Sea used deeper and narrower thermal habitats during warmer periods (Williams et al., 2025). These examples show that sharks may respond to warming by changing their vertical habitat rather than just moving north or south. The vertical habitat shifts are important because they may change fishing risk. If sharks are pushed into narrower depth zones, they may become more concentrated and easier for fisheries to find and catch Changes in depth use can also affect feeding behavior and predator-prey relationships, especially if prey species shift migratory patterns with temperature change.

Conservation is also an important issue here. Many marine protected areas (MPAs) and fisheries rules are based on where species have historically been found. If sharks move outside these areas because of warming, those protective measures may not work as well. Hammerschlag et al. (2022) noted that *G. cuvier* may move beyond some protected zones during warm years. This means shark population management may need to become more flexible as climate change continues.

There are still some limitations in the research. Some studies focus on a single region or species, and many climate effects occur over longer time scales than researchers can easily observe. Temperature is not the only factor, either. Sharks also respond to prey, oxygen, currents, productivity, and human pressures such as fishing and pollution. Future studies should combine long-term tracking, in-situ fisheries records, space-based satellite data, and climate modeling to better understand how sharks will respond.

Conclusion

Climate change is already affecting shark migration and distribution. Specifically, rising ocean temperatures, marine heatwaves, and changing seasonal conditions are causing sharks to shift where they live, when they migrate, how long they stay in certain areas, and what depths they will go.

The studies reviewed in this paper show several clear examples. *G. cuvier* moves farther north and arrives earlier in northern waters. *C. leucas* stays longer in habitats with increased temperature. Multiple Hammerheads are projected to lose their optimal habitat in some tropical regions and shift poleward. *I. oxyrinchus* and *C. falciformis* are changing their vertical habitat use in response to temperature increase.

These changes create new challenges for conservation and fisheries management. If shark ranges continue to shift, protected areas and management boundaries may need to be changed as well. Shark movement changes could also affect food webs, fishing exposure, and overlap between sharks and human activities.

Overall, the research shows that sharks are already responding to climate change, but responses differ among species. Continued long-term monitoring, tagging studies, fisheries data, and climate-based habitat models will be important for better understanding and managing sharks' population dynamics in a warming ocean.

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Williams, C. T., McIvor, A. J., Richardson, E. B., Lea, J., Clarke, C. R., Cochran, J. E. M., Kattan, A., Ormond, R., & Berumen, M. L. (2025). Elevated sea surface temperatures drive greater seasonal depth use in a baited aggregation of silky sharks Carcharhinus falciformis. *Marine Ecology Progress Series, 773*, 115–128.

Osteoporosis: A Complete Review from Etiology to Management Strategies

Literature Review by OMOTAYO PRAISE ASANGA and IBRAHIM ABDULLAZIZ

BIOL 2401: ANATOMY AND PHYSIOLOGY I

Omotayo Praise Asanga and Ibrahim Abdullaziz's paper, focused on osteoporosis, effectively demonstrates their scientific writing skills essential in the health sciences, including the organization and synthesis of peer-reviewed research, the use of discipline-specific terminology, and the clear explanation of complex physiological concepts for an academic audience. These students successfully integrate current scholarly sources to examine the pathophysiology, risk factors, diagnosis, prevention, and treatment of osteoporosis while maintaining logical structure and coherence throughout the review. In addition, the submission reflects important writing practices in allied health and biological sciences, such as evidence-based analysis, accurate citation, and the ability to connect scientific research to public health implications. Overall, this work illustrates strong competency in formal scientific communication and critical research writing appropriate for introductory undergraduate scholarship.

- Anna Howard

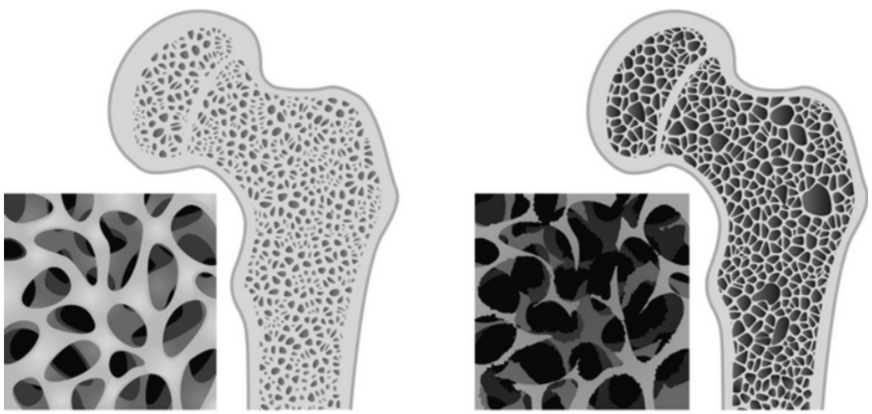
Abstract

Osteoporosis is from a Greek word osteon meaning bone, and porosis which means to be porous, with its combination known as "porous bone or bones with holes." It is a chronic disease of the bone characterized by a decrease in mineral density of bone and architectural deterioration. This metabolic bone disease causes bones to be fragile and susceptible to fractures. It is predominantly one of the world's skeletal disorders mostly affecting older adults and post-menopausal women. This disease becomes unnoticeable until it results in fracture, leading to disability and reduced life quality. This review is set to discuss its pathophysiology, groups at risk, explore its clinical manifestation such as fracture sites, and noticeable physical changes in humans. Additionally, current approach to diagnosis, treatments, prevention, and challenges such as side effects of medications as well as poor adherence are not left out. Despite management advancements, osteoporosis is still highly underdiagnosed and undertreated. Creating the need to improve awareness of the public concerning early detection and sustaining management strategies.

Keywords: Osteoporosis; Pathophysiology; Bone density; Bone remodeling; Fractures; Postmenopausal; Calcium deficiency; Bisphosphonates.

Introduction

Osteoporosis is a chronic bone disease often characterized by a reduction in mass of bone and deterioration, resulting in weak, fragile, and bone susceptible to fracture (Morin et al., 2025). Bone is unique, a very dynamic tissue constantly undergoing remodeling by balancing the activity between bone formation (deposition) and resorption often controlled by parathyroid hormone and calcitonin (Yadav et al., 2026). In healthy people, bone remodeling begins with bone resorption and ends with bone formation (Aibar-Almazán et al., 2022). This simultaneous activity is very important for maintaining the mechanical stress of bone and its strength. However, in osteoporosis, the balance between bone formation and resorption is disrupted, resulting in progressive loss of bone mass and deterioration of bone structure (see figure 1) (Aibar-Almazán et al., 2022). Due to this compromise, even a little trauma can result in bone fractures.



Healthy bone *Osteoporotic bone*

Figure 1: An image of healthy bone vs osteoporotic bone microarchitecture. In the healthy bone, the trabecular (healthy) bone shows dense and well-connected structure, while in the osteoporotic bone, there is reduced or bone loss and increased porosity. This often lead to decrease in bone strength and higher risk of bone fracture. *Osteoporosis - Dr. Joseph G. Zdyrski Chiropractic Clinic*

One alarming concern about osteoporosis is the silent progression it posed. People who have this disease are often unaware and they go without noticing any symptoms until a fracture occurs. Hence its name "silent disease" (Aibar-Almazán et al., 2022). Global record has shown that one out of three young women and one out of five young men or older adults over the age of 50 years are prone to be affected. Strengthening its significance and impact on public health (Lorentzon et al., 2022). Since fractures mostly occur from this disease, it can lead to serious health complications like chronic pain, inability to do things without seeking help such as standing, disability, and increase in rate of mortality.

Despite the advancements in technology and availability of diagnosis tools and treatments, the disease remained underdiagnosed and undertreated. A lot of people do not go for screening until they experience a fracture, highlighting the gap between early detection and prevention. In addition to that, it is difficult to adhere to long-term medication while treating osteoporosis, this may be due to the inconvenience of keeping up with the routine or the side effect of the medication. Therefore, it is essential to conduct comprehensive research on osteoporosis, including its biological mechanism, the risk factors, health consequences, and management strategies. This understanding will help improve the patients' outcome and reduce the burden associated with the disease.

Discussion

Overview and Bone Biology

As mentioned earlier, bones are unique. It is a living tissue which tends to renew continuously via a process called bone remodeling. Figure 2 illustrates that in bone remodeling; the activity of osteoblasts (bone buildup) and osteoclasts (bone breakdown) is highly coordinated by parathyroid hormone and calcitonin (Yadav et al., 2026). This ensures a dynamic balance between these two activities in healthy individuals. This balance helps maintain structural strength and bone density (Aibar-Almazán et al., 2022).

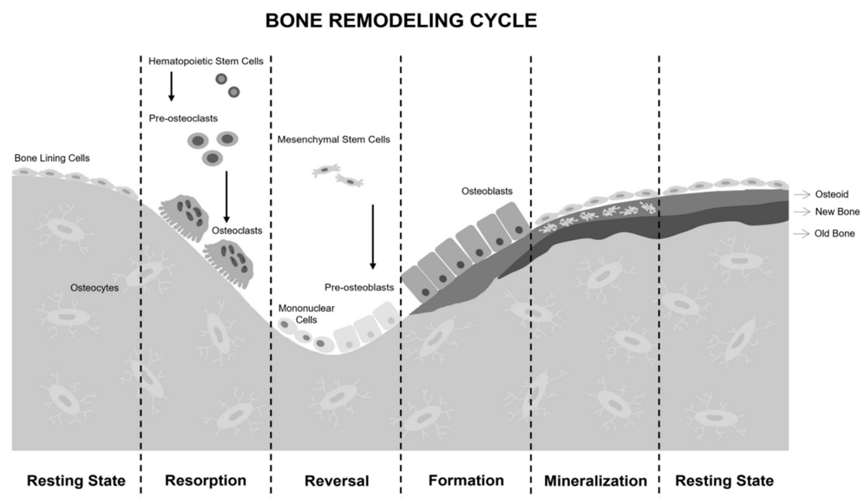


Figure 2: Bone remodeling activity in healthy individual. Beginning with bone resorption and ending with formation. A balance between these two activities is very important and therefore be maintained by bone remodeling to ensure structural integrity of the bone. A slight shift in this balance will result in osteoporosis. (Aibar-Almazán et al., 2022)

A key kind of bone known as cortical bone, provides protection and strength to bone, while another kind called trabecular bone is said to be metabolically active than cortical bone and it plays a major role in bone health maintenance (El Miedany et al., 2024).

Pathophysiology of Osteoporosis

Osteoporosis arises when there is a disruption between bone formation and resorption. In this case, the breakdown activity (osteoclast) of bone supersedes that of the bone buildup (osteoblast), leading to an overall decrease of bone mass. Bones suffering from osteoporosis are often porous and brittle over time, making the bones have high risk of fracture (van Oostwaard & Marques, 2024). The major contributor to the imbalance between osteoclast and osteoblasts is hormonal changes. Estrogen is a significant hormone whose role is to regulate bone metabolism. Estrogen inhibits the activity of osteoclast. After menopause, estrogen level decreases and its regulatory ability is slow down resulting in increase in bone resorption and high bone loss (Lu & Tian, 2023). Again, calcium and vitamin D deficiencies impair formation of bone. Vitamin D is necessary for the absorption of calcium, and at low level can result in an increase in the activity of parathyroid hormone that promotes the breakdown of bone (Li et al., 2023).

Epidemiology and Risk Factors

Osteoporosis is a widely known global condition particularly affecting older adults or people over the age of 50 years. It affects one out of three young women and one out of five young men or older adults raising concern over public health (Vilaca et al., 2022) and (Lorentzon et al., 2022). This decrease mostly remains undiagnosed till it results in fractures, hence it's tagged silent disease. The risk factor of this disease can be classified as both modifiable and non-modifiable risk factors. The modifiable risk factors are often associated with low vitamin D and calcium intake, smoking, lack of exercise, and excessive consumption of alcohol; while the non-modifiable risk factors are defined by age, sex, genetic makeup (Wilson-Barnes et al., 2022). These risk factors strongly contribute to the decrease of bone density and increase the risk of fracture.

Postmenopausal Osteoporosis

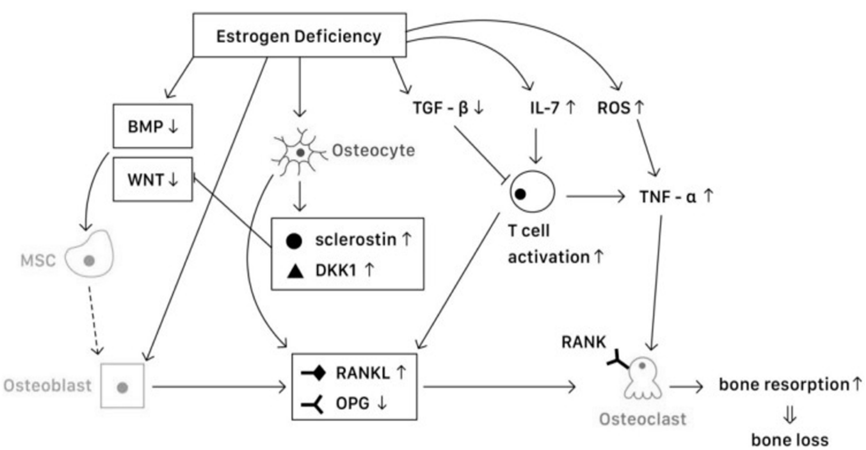


Figure 3: The mechanism showing the deficiency of estrogen hormone resulting in osteoporosis. Mostly called EDOP. (Cheng et al., 2022)

Postmenopausal osteoporosis is the most prevalent form of this disease. It is primarily as a result of estrogen deficiency, known as called estrogen deficiency related osteoporosis (EDOP) (see figure 3) (Cheng et al., 2022). The activity of osteoclast is maintained by estrogen hormone. After menopause, bone resorption and loss in mass becomes rapid due to the sharp fall in level of estrogen (Lu & Tian, 2023). This type of osteoporosis mostly affects the trabecular bone, especially at the spine and the hip region (Bauer et al., 2025). Women are known to experience the loss bone the most and common at five to ten years of post-menopause raising the need for early intervention.

Clinical Manifestations and Fracture Risk

Increased risk of fracture remained the most serious effect of osteoporosis, accompanied by minimal trauma. Figure 4 is an image of most common sites of fracture, they include; the spine, wrist, and hip (Bauer et al., 2025). These fractures can result to morbidity (disability) and even mortality (death) in older adults. Fractures in the vertebral column may lead to serious back pain, height loss, and kyphosis or stooped posture because of spinal/vertebral compression (Barker et al., 2025). Surgical intervention is often required for hip fractures that are connected to long-term morbidity and show risk of death. Daily functioning can be interrupted by wrist fracture, which can also lead to future fractures (Bauer et al., 2025). The incident of one kind of fracture may significantly raise the occurrence of subsequent fractures.

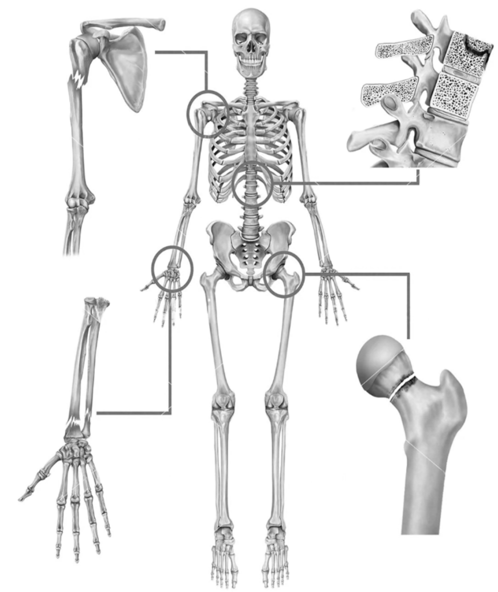


Figure 4: Common fracture sites include wrist, hip and spine. *Fractures to Various Parts of the Skeleton – Medical Stock Images Company*

Diagnosis and Screening

Bone Mineral Density Test (BMD Test) is used to primarily diagnose osteoporosis using the Dual-Energy X-ray Absorptiometry Scan (DEXA Scan). Results from this test are expressed as T-Scores, with the score reported to be -2.5 or lower. This indicates osteoporosis (Morin et al., 2025). Early screening matters especially in population with high risk of osteoporosis as many people are not screened for the disease despite the access to diagnostic tools until they start experiencing fracture. Therefore, it is essential to ensure prevention of the disease to reduce risk of fracture.

Prevention Strategies

Prevention cannot be overemphasized as it is very important. This involved maintaining a healthy bone lifestyle. Adequate intake of vitamin D and calcium is necessary for good bone health (Li et al., 2023). Engaging in weight-bearing exercise also helps to strengthen the bones and also improve balance, thereby reducing the risk of fall (Alnasser et al., 2025). Modification of lifestyle such as limiting consumption of alcohol and total refrain from smoking are also very important. Again, getting the bone density test helps promote early detection and intervention (Lauren Pfieffer et al., 2025). These preventive measures are crucial to reduce the incidence and effect osteoporosis.

Treatment and Management

Osteoporosis can be treated both by maintaining a good lifestyle and pharmacological interventions. A good lifestyle like practicing a healthy diet continuously, engaging in exercise regularly, and taking good supplements are important components of management strategies (Alnasser et al., 2025). Bisphosphonate is a pharmacological treatment known to reduce bone resorption, and some medications like denosumab and modulator of estrogen receptors can also provide good management measures. Therapy such as hormone replacement may also be helpful in certain cases especially for women at the age of menopause (Cosman et al., 2024). While most of these treatments are known to be effective, they also have side effects. For example, bisphosphonates can lead to gastrointestinal discomfort. Other treatments may also increase infection risk, or some may lead to cardiovascular complications, making adhering to this medication difficult (Sharafi et al., 2025).

Limitations and Challenges in Management

Despite the advancements in treatment, managing osteoporosis remains challenging. One major problem is the adherence to the medication mostly from its side effects and insufficient awareness. Again, many people are ignorant of the disease until they experience fracture (Aibar-Almazán et al., 2022), limiting early intervention and its effectiveness. To address most of these challenges, patients' education must be improved, increase awareness, and finally early screening should be promoted to ensure long-term results.

Conclusion

Osteoporosis remained a global health concern characterized by a loss in bone density and increase in risk of fractures. Early detection, preventive measures, and effective management is said to retard the silent progression of the disease. While advancements in the treatment of osteoporosis have proven to improve the patients' outcomes, underdiagnosis and poor adherence to treatment remain a challenge. The research has therefore provided a comprehensive review including manifestation of lifestyle, early screening, and right medication intervention to reduce the burdens of osteoporosis.

Future Work

Future study on osteoporosis is set to focus on the improvements on early detections, safer and effective treatment, and finally enhancing patients' adherence to therapy. Personalized medication procedures and genetic screening can promote the prevention and treatment measures. Additionally, public awareness can provide quality education concerning bone health to mitigate the dangers of osteoporosis as people age.

Glossary

Bisphosphonates: A class of medications that strengthen bones by slowing down the natural process of bone breakdown.
Bone Formation: The biological process of creating new bone tissue.
Bone Microarchitecture: Refers to the intricate, three-dimensional lattice-like structure of bone tissue at a microscopic level.
Bone Mineral Density (BMD) Test: Is a test used to measure the amount of calcium and other minerals in the bones.
Bone Remodeling: A lifelong, continuous process where mature bone tissue is removed from the skeleton and new bone tissue is formed.
Bone Resorption: The natural process by which specialized cells called osteoclasts break down bone tissue, releasing minerals like calcium into the bloodstream.
Calcitonin: Is a hormone produced by the thyroid gland that helps regulate blood calcium levels by slowing bone breakdown and reducing bone calcium loss.
Calcium Deficiency: Is a condition where your blood has abnormally low levels of calcium.
Dual-Energy X-Ray Absorptiometry (DEXA) Scan: Is a rapid, non-invasive imaging test that uses low-dose X-rays to measure bone mineral density (BMD) and body composition.
Epidemiology: The study of the distribution, frequency, and risk factors of diseases within populations.
Estrogen: Is a primary sex hormone responsible for developing and regulating the female reproductive system and secondary sexual characteristics. It also protects bone density, supports cardiovascular health, and influences brain.
Estrogen Receptors: They are specialized proteins located either on the surface of a cell or inside it to bind to the hormone estrogen.
Etiology: Is the scientific study of the causes, origins, or reasons behind a disease or condition.
Fracture: This is a partial or complete break in the bone.
Gastrointestinal Discomfort: Refers to a broad range of symptoms in the digestive tract, including bloating, cramping, gas, heartburn, and changes in bowel habits.
Kyphosis: Is an excessive, outward forward curvature of the upper back that creates a hunched or stooped posture.
Metabolic: The complex network of life-sustaining chemical reactions in the body that converts food into energy.
Morbidity: Is the state of being diseased, injured, or experiencing health complications from a medical condition or treatment.
Mortality: The case of death, i.e the rate at which individuals die within a population.
Osteoblasts: They are the specialized cells responsible for forming new bone tissue.
Osteoclasts: They are specialized bone cells that break down and resorb bone tissue.
Osteon: Also called a Haversian system, is the fundamental functional unit of compact bone.
Osteoporosis: A silent bone disease that causes bones to become weak, porous, and highly fragile.
Parathyroid Hormone (PTH): Is a protein hormone secreted by the four pea-sized parathyroid glands located behind the thyroid. Its primary function is to regulate and maintain the delicate calcium and phosphorus balance in the blood and bones.
Pathophysiology: Is the study of how normal physiological processes are altered by disease or injury. This can be related to how the disease develops and affects the body.

Porosis: A condition referring to an increase in pores or abnormality within a bodily structure. It is most commonly the root of osteoporosis (porous bones).
Post-Menopausal Osteoporosis: An accelerated bone loss, common after menopause (due to drop in estrogen level).
Stooped Posture: An excessive forward curve of the upper spine.
Trabecular Bone: Also known as cancellous or spongy bone, is a porous, lattice-like tissue found inside the ends of long bones (like the femur) and within the vertebrae.
Vertebral Compression: This occurs when the bony block or vertebral body in the spine collapses.
Vitamin D: Is a fat-soluble nutrient essential for strong bones, muscle function, and a healthy immune system.

To view the images from this article in color, please scan the top QR code on pg. 116 or visit https://lscmontgomerycac.com/visual-communication-2026/

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Testing the Bioremediation Potential of Oyster Mushrooms on Cigarette Butts

Grant Proposal by
ZACHARIE LETTER and
MADISON AXTON

INDEPENDENT RESEARCH

This grant proposal was written for the student research grant available through the LSC-Montgomery Undergraduate Research Institute (URI). Their research question is focused and shows their interest in sustainable environmental solutions. From the start, they worked together to study mycoremediation and develop their ideas through careful reading and discussion. Their literature review is thorough and shows a strong understanding of how their work fits into a larger scientific conversation. The methodology is well-organized and shows careful planning and scientific reasoning. In addition to designing the experimental framework, Zacharie and Madison created a detailed project timeline and budget. This demonstrates their ability to foresee logistical needs and manage resources. They took full ownership of the project, drafting and revising the proposal together and seeking feedback only after completing several peer-driven revisions. The grant committee reviewed the proposal and selected it for funding through the URI.

- Anitha Iyer

Abstract

Discarded cigarette filters remain one of the most ubiquitous forms of plastic waste in our world today, with an estimated 1.2 million tonnes of filters ending up as litter in the environment each year. These filters are designed to trap toxic compounds like tar, nicotine, heavy metals, and more before they reach the lungs of the smoker. Once these filters find their way into water and soil systems, these toxins leach into the environment while the filter itself resists biodegradation and contributes to microplastic pollution. Multiple studies have shown macrofungi, especially white rot fungi in the genus *Pleurotus*, to be effective at remediating a variety of such pollutants. A 2014 study by Updyke demonstrated the ability of *Pleurotus* to grow on a substrate of used cigarette filters. While this study focused on the financial feasibility of this process, it did not address concerns of the edibility of mushrooms produced in this way. This study aims to determine whether *Pleurotus* mushrooms grown on a substrate of used cigarette filters are suitable for human consumption.

Literature Review / Background

Over six trillion cigarettes are consumed globally each year [1]. Of these, an estimated 4.5 trillion used filters are discarded into the environment [1], the equivalent of 1.2 million tonnes of waste annually [2]. The ICC reports cigarette butts as the most recovered item found during their beach cleanups since their project began [3], while a 2017 report from Clean Up Australia found them to comprise 91.5% of recovered items in their miscellaneous waste category [2]. These filters are flicked onto the ground or out of car windows with one national survey by the American Legacy Foundation reporting that 74% of their 1000 respondents admitted to disposing of cigarette butts in this way [1]. Observational studies show this percentage to be even higher, in some cases up to 95%, revealing littering to be the norm for many smokers [1].

Once littered, the filters are washed into storm drains then make their way out of the urban environment and into soil and water systems, with many eventually ending up on beaches and in the ocean. Cigarette filters are designed to trap toxic substances released when the cigarette is smoked before reaching the lungs of the smoker. These substances, both gaseous and particulate, may become toxic in environments where used cigarette filters are littered or anywhere along the routes they take through various environments as these substances leach out into water and soil or are consumed by animals [1, 2, 4]. Studies from Japan, Australia, and the United States have found leachate from tobacco waste in aqueous environments contains substances such as arsenic, nicotine, polycyclic aromatic hydrocarbons (PAHs), ethyl phenol, and heavy metals including lead, copper, nickel, cadmium, and more which have the potential to affect pH levels and become acutely toxic to organisms which play vital roles in the nutrient cycles of both soil and water ecosystems [1]. These chemicals along with other constituents of tobacco smoke which are retained in smoked filters (formaldehyde, benzene, and aromatic amines, among others) combine to form dozens of known carcinogenic chemicals [4]. Beyond just the leachate from tobacco waste, animals often come into contact with these carcinogens through ingestion [4].

Environmental contaminants from tobacco waste have clear routes through which they may affect humans as well. Surface and ground water pollution and soil pollution open paths for bioaccumulation of toxic substances which magnify as they move up the food chain [2]. Even when disposed of properly, cigarette waste can pose an environmental threat as the cost of handling toxic landfill wastes increases. Toxic wastes in landfills pose serious risk of ground water contamination if facilities are not managed properly, and the efficacy of incineration methods remain questionable due to the costs associated with gaseous emission abatement and the creation hazardous ash which must still be disposed of [4].

About 90% of commercially available cigarettes are produced with filters made of cellulose acetate [4], a material made from the esterification of cellulose wood pulp with acetic acid to prevent combustion and spoilage, provide structure to the filter, and improve solvent penetration [2, 5]. Ester substitution along with the use of plasticizers, compactness of the fibers (as many as 12,000 individual fibers per filter), and the tipping paper covering make cigarette filters very slow to degrade [2, 3, 4]. Photodegradation is inhibited by the paper wrapping and deacetylation via hydrolysis tends to be slow under ambient conditions [2]. Rate of degradation varies by the environment, but general figures place the rate of degradation of cellulose acetate at 1-2 months in anaerobic soil conditions, 6-9 months in freshwater, and exceeding 12 months under poorer conditions [2, 4]. As the cellulose acetate slowly fragments, the resulting microplastics can persist in the environment for up to 15 years [2].

Macrofungi, particularly white rot fungi such as those of the genus *Pleurotus* (oyster mushrooms), have been the subject of much research into new mycoremediation techniques aimed at addressing these and other environmental pollutants. *Pleurotus* is a genus of mushroom-forming basidiomycete fungi containing several of the world's most commonly cultivated mushrooms [5]. The type species, *P. ostreatus*, is grown on a variety of substrates all over the world with an annual global production of 4,830 metric tons (over 10.5 million pounds) [6]. *P. ostreatus* is a saprotrophic fungus which prefers to feed on dead hardwood in its natural habitat. The enzymes that allow it to digest the complex structure of wood include lignin peroxidase and laccase which initiate oxidation reactions that release free radicals which further break the chemical bonds of its food [5].

These unique metabolic processes allow *Pleurotus* species to digest lignin and cellulose-like synthetic materials including the cellulose acetate in cigarette filters [5]. A study by Updyke (2014) demonstrated the ability of three species of *Pleurotus* (*P. ostreatus, P. djamor, and P. citrinopileatus*) to produce fruiting bodies when grown on a selection of cigarette filter substrates [5]. Another compelling study by Espinosa-Valdemar (2011) produced gourmet quality mushrooms free of pathogens from substrates derived from used disposable diapers [6]. While Updyke's study focused on the economic feasibility of producing mushrooms as a food crop using cigarette waste as a substrate, it did not address concerns of the edibility of mushrooms produced in this way.

Purpose and Research Questions

The purpose of this study is to determine whether *P. ostreatus* can grow on a substrate of used cigarette filters, degrade the contaminants within, and produce mushrooms which are safe for human consumption.

A. *Substrate remediation*
Pleurotus species are some of the most commonly employed macrofungi in applied mycoremediation. Their complex metabolisms have been shown to be effective at remediating a wide range of common toxic chemical compounds by converting them into inert forms which are then able to re-enter nutrient cycles [7]. They are also known to effectively extract heavy metals from their environments and accumulate them at differing levels in their mycelium and in various morphological sections of their fruiting bodies [7, 8, 9]. To gauge the efficacy of this application in remediating the environmental threats posed by cigarette waste, an analysis of the test substrates will be carried out before and after the testing period to determine any difference in presence and concentration of contaminants.

B. *Edibility*
Studies such as that of Updyke [5] and anecdotal evidence from mycologists like Peter McCoy [10] have clearly demonstrated the ability of Pleurotus species to subsist and form reproductive structures on a diet of used cigarette filters. However, in order for this potential food source or business structure to be viable, the mushrooms produced by these methods must be safe to eat. The crux of this study will be an analysis of the fruiting bodies to note the presence and concentrations of hazardous chemicals which have known adverse health effects in humans.

Research Design and Methodology

A. *Initial Testing and Controls*
The baseline chemical content of used cigarette filters will be determined via High Performance Liquid Chromatography (HPLC). Two controls will be established: one control for the filter substrate with no fungal culture added and one control for the mushroom growth on a traditional substrate.

B. *Two-Stage Incubation Period*
The trial cultures will be incubated in a two-step process. First, they will be incubated on a substrate of only clean, unsmoked cigarette filters so that the fungus can acclimate to using the cellulose acetate as a food source without the added shock of the toxins in smoked filters. After extensive colonization of the clean filter substrate is observed, the used filter substrate will be added and the cultures allowed to incubate again.

C. *Substrate Remediation*
After the fruiting stage is complete and mushrooms are harvested, the spent substrates will be analyzed via HPLC and the results will be compared to the baseline established in part A to determine if any degradation of the chemicals within has taken place as the fungus fed on the filters. A graphical representation of the data will be generated.

D. *Edibility*
After the fruiting stage is complete, mushrooms will be harvested, dried, ground, and assayed via HPLC. The results of the mushrooms grown on test substrates will be compared to those of the used filter baseline as well as the mushrooms grown on a traditional substrate to compare the presence of toxins in each. A graphical representation of the data will be generated.

Implications

Cigarette waste continues to be a source of environmental and aesthetic pollution throughout the world. The effects of this pollution tend to impact rural and low-income communities the most, as these are the populations which contain the greatest percentages of cigarette smokers [11]. These areas are also more likely than urban areas to meet the USDA's criteria for food desserts [12], areas where access to healthy fresh foods is limited. These areas are characterized by low average household income, low population, and low overall health rankings [12].

If the results of this study demonstrate the feasibility of edible mushroom production from cigarette waste, this could open new possibilities for individuals and communities in these areas to supplement their diets with a protein and nutrient rich food source while simultaneously reducing the aesthetic and environmental pollution within said communities. New revenue streams based on the growth methods employed in this study could become viable if this method proves effective at producing healthy gourmet mushrooms.

Even if the mushrooms themselves are inedible, possible applications could arise for the remediation of certain pollutants and contaminated substrates which have the potential for wide application across the realm of bioremediation, such as the reduction of microplastic pollution or the handling of collected toxic wastes like spent cigarette filters.

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The Runner with a Stress Fracture

Case Study by
YASMIN RAMIREZ

BIOL 2401: ANATOMY AND PHYSIOLOGY I

Students were given a case study relevant to the course and asked to write a patient case report on the topic and provide a relevant illustration of the body system studied. Yasmin did an excellent job of being concise whilst giving the appropriate level of detail required. Her illustration of the body system affected was excellent. In this case the body system was the skeletal system, and she provided a beautifully labeled drawing that was adequately discussed in the text. Jasmin's understanding of the skeletal anatomy was very clearly shown in her description of the pathophysiology. This is exactly what I was looking for with this project and Yasmin took the opportunity to showcase her writing and understanding of human anatomy.

- Dr. Helen McDowell

Patient Summary

The case study describes the case of a teenage cross-country runner experiencing pain in her right tibia, also known as the shin. The patient Maria lives a quite active lifestyle as a college student, going on long runs and having recently increased her weekly mileage by 40%. Maria is nineteen years old and reports a low calcium intake in her diet throughout her life.

Symptoms & Diagnostic Test

Over the past three weeks, Maria has reported a persistent dull pain in her right tibia, stating that it continues even when she walks. Her healthcare provider performed a palpation by using their fingertips to apply light pressure to the area of the pain to assess swelling, temperature, texture, and tissue changes (Mayo Clinic, 2025). This physical exam reported mild swelling and localized tenderness along the tibia. Furthermore, a calcium blood test was performed by drawing blood to assess the amount of calcium in the blood, which revealed that Maria's blood calcium levels were slightly low (MedlinePlus, 2024). Finally, an X-ray was conducted on her right tibia to find any fractures or possible abnormalities, which showed early signs of a stress fracture. The clinical findings ultimately revealed that Maria's localized pain in her right tibia is the result of an early stress fracture combined with swelling and tenderness in the affected area. These findings point to a low-risk medial tibial grade two stress fracture (Kahanov et al., 2015).

Normal Physiology

The tibia is part of the appendicular skeleton as a long bone of the lower extremity, serving several functions in the human body. Its classification as a long bone derives from its cylindrical shaft with two enlarged surfaces at each distal end, formed with compact bone on the outer layer and trabecular bone deep to the compact bone. Additionally, as seen in Figure 1.1, the tibia has a medullary cavity within its diaphysis, with yellow bone marrow filling the interior in the adult bone. Among the important characteristics of the skeletal system are its structural support, ability to resist compression, and its function as a mineral storage site for the body (Haynes et al., 2026). As a bone of the lower limb, the tibia supports the body while executing daily activities such as walking, exercising, and standing, working in conjunction with other bones and muscles. As illustrated in Figure 1.1, it is composed of both compact and spongy bone, forming a sturdy framework that resists stress and compression. Furthermore, the bone is made up of both organic components, such as bone cells, and inorganic mineral salt components (Haynes et al., 2026). Each bone cell serves a different function, ranging from secreting bone matrix to breaking down bone. Mineral salts give the bone its resistance to compression, making up to 70% of bone weight, primarily consisting of calcium and phosphate salts (Šromová et al., 2023).

Calcium is a vital component of bones, so important that the human body has an implemented mechanism in the event of a lack or excess of it. Calcium homeostasis is the process that the body uses to restore calcium to the normal 9-11 mg/dl, utilizing hormones and bone cells to carry it out (Haynes et al., 2026). In the case of low Calcium blood levels, the imbalance stimulates the parathyroid glands to release parathyroid hormone (PTH). This hormone then stimulates the activity of osteoclasts, which work to break down bone matrix and release calcium into the blood, ultimately raising blood calcium levels back within the normal range (Haynes et al., 2026). A different hormone, calcitonin, is released by the thyroid in response to an increase in calcium. Calcitonin then stimulates osteoblasts to increase the deposition of calcium in the bones, as well as restricting the renal calcium resorption (Yu & Sharma, 2023). This ultimately lowers blood calcium levels and restores them to the normal amount.

Although bones are sturdy, they have mechanisms set in place to respond to mechanical stress and change throughout a person's life, called bone remodeling. Bone remodeling can be divided into three different categories: resorption, deposition, and response to mechanical stress (Haynes et al., 2026). Bone resorption is carried out by osteoclasts, multinucleated cells that work to break down bone matrix, leaving behind a round depression within the bone (Rowe et al., 2023). Bone deposition, on the other hand, is executed by osteoblasts, which deposit minerals and new collagen in the bone. After they have completed the deposition process, the cells undergo apoptosis, become an osteocyte, or become part of the bone matrix (Rowe et al., 2023). Finally, in response to mechanical stress, bones remodel or grow based on the stress that is inflicted upon them (Haynes et al., 2026). This is explained by Wolff's law, stating that bones will adapt to the mechanical stress placed upon them by either strengthening or weakening the cortical and trabecular layers. In the case of increased mechanical stress, osteocytes within lacunae of compact bone detect electrical currents created by bone deformation, which then stimulate bone deposition to strengthen the bone (Haynes et al., 2026). Where the compression is the greatest, the compact and spongy bone becomes thicker in order to adapt to the increased mechanical stress. On the other hand, if there is a lack of use of a bone, the bone layers start to weaken.

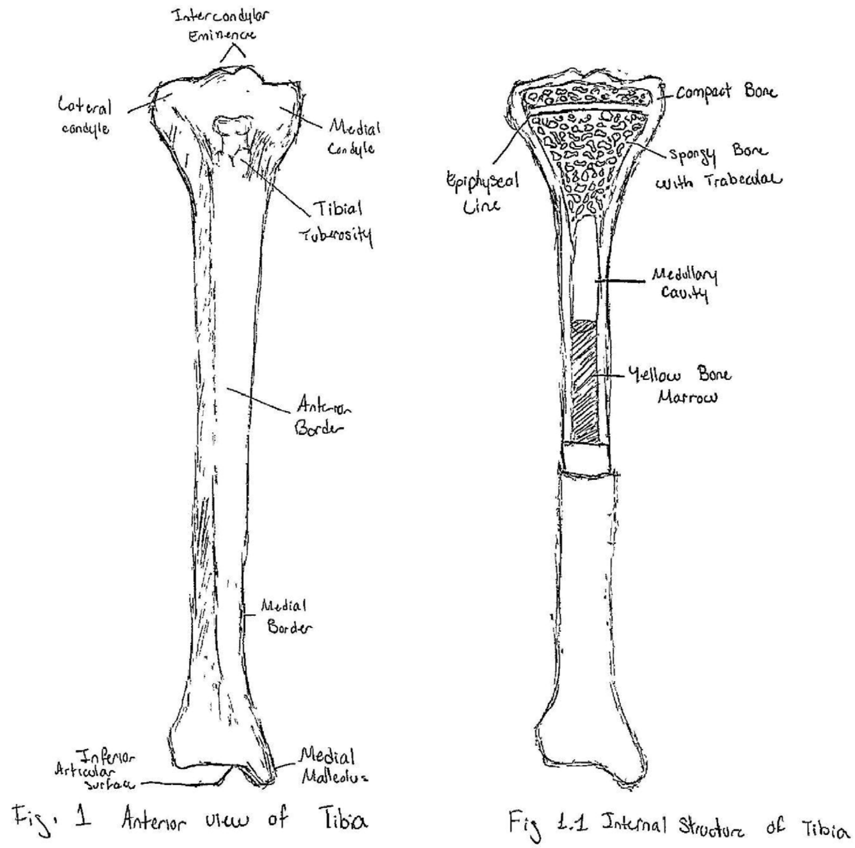

Figure 1: Zhang, C., & McCully, K. K. (2020)

Pathophysiology

In the case of the patient, her right tibia has begun to show signs of a stress fracture. According to the symptoms and diagnosis, the tibia is showing signs of a stress fracture along the medial border (Figure 1), indicating a low-risk injury. This can be due to the many factors involved in her active lifestyle and nutritional mineral intake. As stated in the patient summary, Maria is a cross-country runner who recently increased her weekly mileage by 40%. This indicates that her bone experienced a sharp increase in the mechanical stress imposed upon it, exceeding bone repair and growth. This was a major factor in her stress fracture, as the bone does not have sufficient time to adapt, leading to microfractures (May & Marappa-Ganeshan, 2023). The microfractures, in combination with osteocyte apoptosis and a lack of bone adaptation, eventually led to her tibial stress injury (Hoenig et al., 2022).

Additionally, since the excessive stress induced by the exercise promoted osteocyte apoptosis, bone deposition was insufficient in remodeling to adjust in time (Wu et al., 2024).

In addition to the sharp increase in mileage, the patient has reported low calcium intake, and blood tests revealed low blood calcium levels. As seen in the previous section, calcium is a vital element for bone health. Since her body is lacking calcium, the parathyroid gland is consistently releasing PTH, stimulating osteoclasts to break down bone matrix in order to bring blood calcium levels back within a healthy range (Haynes et al., 2026, pp. 173−193). This means that Maria's tibia was potentially weakened due to the constant breakdown of her bone, placing her at a higher risk for a stress fracture. Both her active lifestyle as an athlete and her nutritional choices played major roles in the development of the patient's stress fracture.

Treatment & Prevention

Due to the early nature of her stress fracture, Maria's treatment plan will involve conservative management and dietary changes. As her symptoms and history are most consistent with a medial tibial stress fracture, the injury is low risk but should still be managed for healing and prevention (Kahanov et al., 2015). Since the patient's low-risk injury is at an early stage, surgery would not be necessary. Instead, her treatment would focus on activity restriction and low-impact activities to ensure bone healing and a safe return to her active lifestyle (Hoenig et al., 2022).

The first stage of her treatment plan would involve a resting period and the use of crutches when walking for seven days, minimizing tibial bone loading. A group of researchers (2021) studied the effects of a resting period on elite infantry recruits experiencing symptoms aligning with a medial tibial stress fracture, like tibial pain and tenderness in the area of injury. The symptomatic recruits were restricted from running and reduced their physical activity. The findings revealed that out of twenty-six recruits, eighteen were able to return to duty with no symptoms after the resting period, proving rest to be a major factor in the stress fracture healing process (Milgrom et al., 2021). After Maria is pain-free and the resting period is over, she may begin to make a gradual return to her activity as a cross-country runner. She can begin by implementing non-strenuous exercises like swimming and cycling, and then moving up to running if she remains pain-free. Her return to sport process should follow the 10% rule, increasing her weekly mileage by 10% each week (Kahanov et al., 2015). Maria should also follow this rule for future prevention of re-injury, avoiding a sudden increase in stress applied to the tibia.

To address the patient's low calcium intake, which played a role in the fracture, she must increase her dietary intake of calcium to achieve 1,000 mg per day. This would involve incorporating calcium-rich foods such as dairy, leafy green vegetables, and fish in her diet to boost calcium intake (Mayo Clinic Staff, 2022). Additionally, to aid with calcium absorption, she should increase her vitamin D intake by going outside on sunny days and eating vitamin D-rich foods like salmon. These dietary modifications will aid in the prevention of re-injury (Hoenig et al., 2022).

In total, the patient's treatment plan for successful healing and full return to her sport should take around four to six weeks, with dietary changes aiding in the prevention of recurrent injury (Kahanov et al., 2015).

Opinion

This case study reflected an injury inflicted by a lack of nutritional calcium intake and an extremely sharp increase in mechanical stress on the patient's tibia. Although the injury has a relatively simple recovery process, I believe it could have been prevented had the patient followed the 10% rule when increasing her mileage. However, it was very interesting to study an injury that many athletes also suffer from. Luckily, her fracture was caught at an early stage and is of low risk, optimizing a speedy recovery and return to sport. In the prevention of more people suffering from this injury, we could spread awareness about how to prevent a stress fracture and the best way to heal a fracture that has already happened.

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Distillation Pre- and Post-Lab

Lab Report by
BIANCA DELAFLOR

CHEM 2423: ORGANIC CHEMISTRY I

Bianca's lab report gives a thorough procedure describing what was performed, including an incredible hand drawing of the apparatus and accurately and honestly records the data. Her post- lab analysis describes what went well and explains why the data was not perfect. Her conclusion and assignment answers show a clear understanding of the principles of distillation.

- Michael Sundermann

The purpose of this experiment is to learn how mixtures of liquids can be separated and purified using fractional distillation. The experiment demonstrates how differences in boiling points and vapor pressures allow liquids to separate during evaporation and condensation. The boiling ranges and masses of collected fractions are measured to evaluate the effectiveness of the separation. The experiment also examines the limitations of distillation when azeotropes are present.

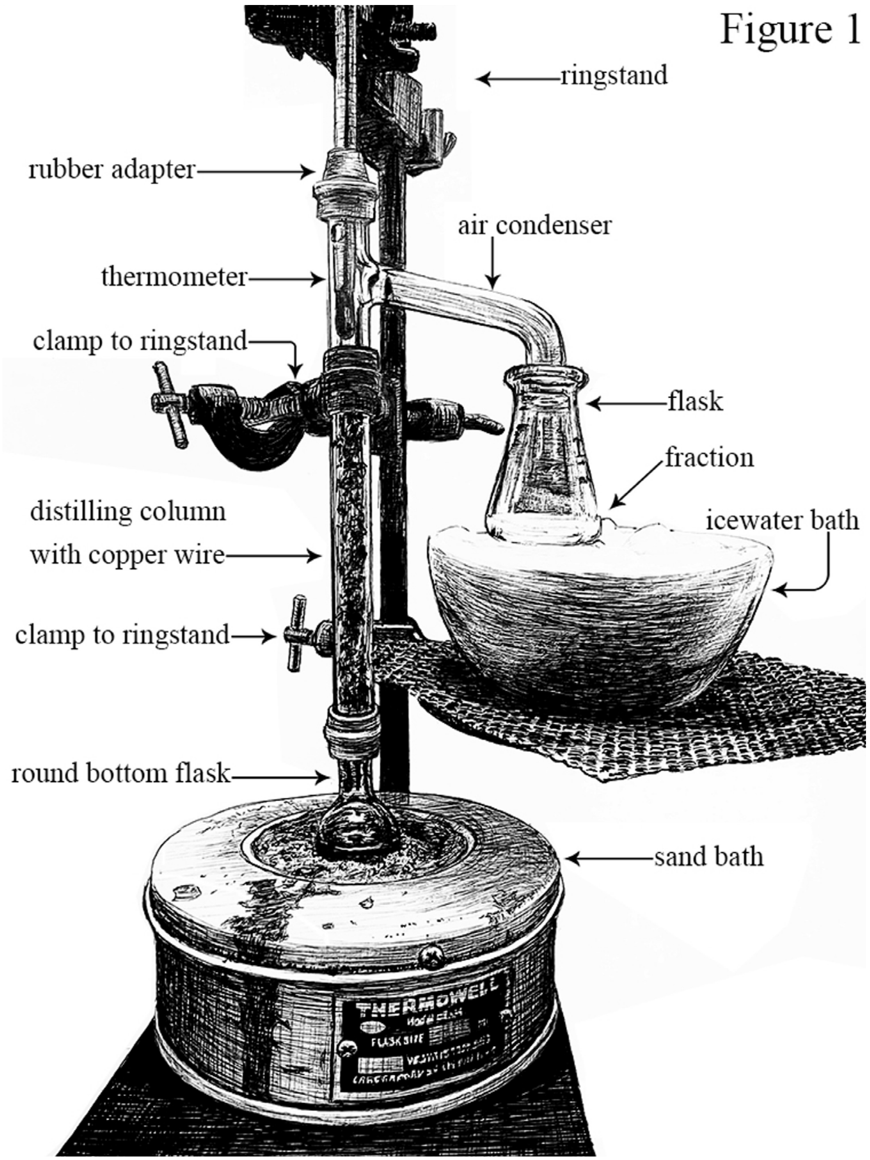
There were no chemical reactions performed in this experiment. Distillation is a physical separation technique that relies on the processes of evaporation and condensation rather than the breaking or formation of chemical bonds. This method was applied to mixtures such as cyclohexane and toluene, water and ethanol, as well as an unknown mixture of two liquids.

Safety hazards of this experiment include:

- Avoid contact of all liquids with eyes and skin. Safety goggles must be worn at all times in the lab. Gloves may be worn.
- Never distill to dryness, because explosive peroxides can form when no liquid remains.
- Organic solvents such as toluene, cyclohexane, and ethanol are highly flammable.
- Hot sand baths, hot glassware, and vapors can cause burns.
- A boiling stone must be used to ensure smooth and controlled boiling. This boiling stone prevents a roaring boil.
- Chemicals should be handled in a fume hood due to vapors, unless specified otherwise.
- Dispose of liquid chemical waste in the nonhalogenated waste container.

Monday, March 2, 2026: Part 1. The team measured out 1.5006 g of cyclohexane in one micro Erlenmeyer flask and 1.4999 g of toluene in another micro Erlenmeyer flask. Then set up the fractional distillation apparatus (see Figure 1) under the fume hood. The measured out cyclohexane and toluene were then poured into a round bottom flask with a few tiny chips of boiling stone and placed in the sand bath under the fume hood. The team then waited and observed for drops to form. However, no drops formed. It was suggested it may be because the location of the fume hood was colder on the far right of the room, so the team concluded to use the fume hood on the far left side of the room instead, for next trial. It was also concluded that there may have been too much copper put into the distilling column which may have blocked vapor from passing through.

Figure 1



Wednesday, March 4, 2026: Trial 2. After setting up the fractional distillation apparatus and insulating the column with foil. The cyclohexane weighed out to be 1.5001 g and the toluene weighed out to 1.5067 g. Both these solutions were pipetted into a round bottomed flask and put into a sandbath attached to the apparatus. The drip started at 65-73°C. The Erlenmeyer flask was then switched out to a new flask. The temperature then shot up and started dripping between 97°-115°C and it was weighed out to be 0.8259 g. The temperature ranges are shown in the data table, with the temperature that most liquid distilled at shown in bold.

Part 1 Data	Mass	Temperature Range
initial Toluene	1.5067 g	
initial Cyclohexane	1.5001 g	
fraction 1	1.2090 g	65-73 °C ***(81 °C)***
fraction 2	.8259 g	97°-115 °C ***(111 °C)***

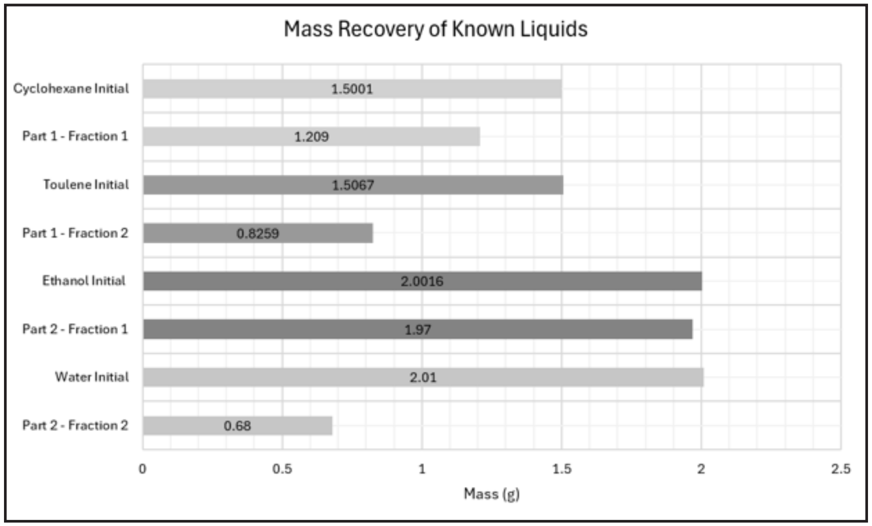
Monday: Part 2. The team measured out 2.0016 g of ethanol in one micro Erlenmeyer flask and 2.0100 g of water in another micro Erlenmeyer flask, and then set up the fractional distillation apparatus (see figure 1). The ethanol and water were then poured into a round bottomed flask with a boiling stone and placed into the sandbath (not under the hood). When the temperature on the thermometer hit 70°C the vapor in the air condenser began to drip into the Erlenmeyer flask sitting in the ice bath. The boil stopped at 73°C and then the temperature quickly climbed to 90°C, at which point the Erlenmeyer flask was switched out, and another empty Erlenmeyer flask was used. From 90-91.0°C the next few drops were gathered for the second flask. The initial weight of the first flask was 15.0 g, after distillation the first flask weighed 16.97 g. The second flask initially weighed 16.42 g, and after distillation, the second flask weighed 17.1 g. Thus the weight of the first faction was 1.97 g and the weight of the second faction was 0.68 g.

Part 2 Data	Mass (g)	Temperature Range (°C)
ethanol	2.0016 g	
water	2.0100 g	
faction 1	1.970 g	70-73 °C ***(78 °C)***
faction 2	0.680 g	90-91 °C ***(100 °C)***

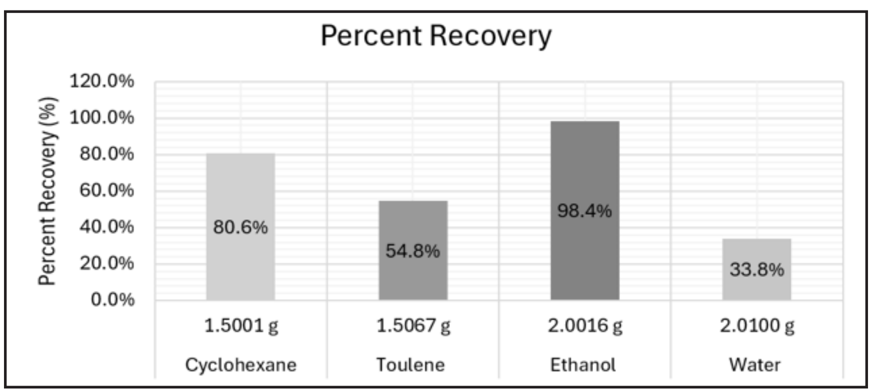
Monday: Part 3. The team set up the fractional distillation apparatus under the fume hood. Unknown E was picked and weighed. The empty Erlenmeyer flask weighed 20.1179 g and with solution unknown E the flask weighed 23.2033 g, making solution unknown E to weigh 3.0854 g. Solution unknown E was then pipetted into a round bottomed flask and placed on the sandbath under the fume hood to boil. A few chips of boiling stone were added to unknown solution E as well. After waiting some time, the team saw the first drop at 67°C, and it continued to drip until 70°C. The flask was then switched out and weighed out to be 0.3393 g after distillation for the first fraction. There was not enough liquid left in the round bottomed flask to get a second fraction during trial 1. This was trial 1 on Monday March 2, 2026.

Wednesday: The unknown E was weighed out to be 3.001 g. It began to drip at 55°-70°C and the weight was 1.450 g for the first faction. Then a new flask was swapped with the first and it began to drip 87°-93°C. It was weighed out to be 0.8931 g.

Part 3 Data	Mass (g)	Temperature Range (°C)
Unknown E initial	3.0854 g	
faction 1	1.450 g	55-70 °C (***81 °C***)
faction 2	0.8931 g	87-93 °C (***117 °C***)



Data	Mass (g)	Sigma-Aldrich Literature Boiling Point (°C)	Observed Fraction Boiling Range (°C)	Percent Recovery (%)
Cyclohexane	1.5001 g	80. 7 °C	65 - 73 °C	80.6%
Toluene	1.5067 g	110 - 111 °C	97 - 115 °C	54.8%
Ethanol	2.0016 g	78.3 °C	70 - 73 °C	98.4%
Water	2.0100 g	100 °C	90 - 91 °C	33.8%



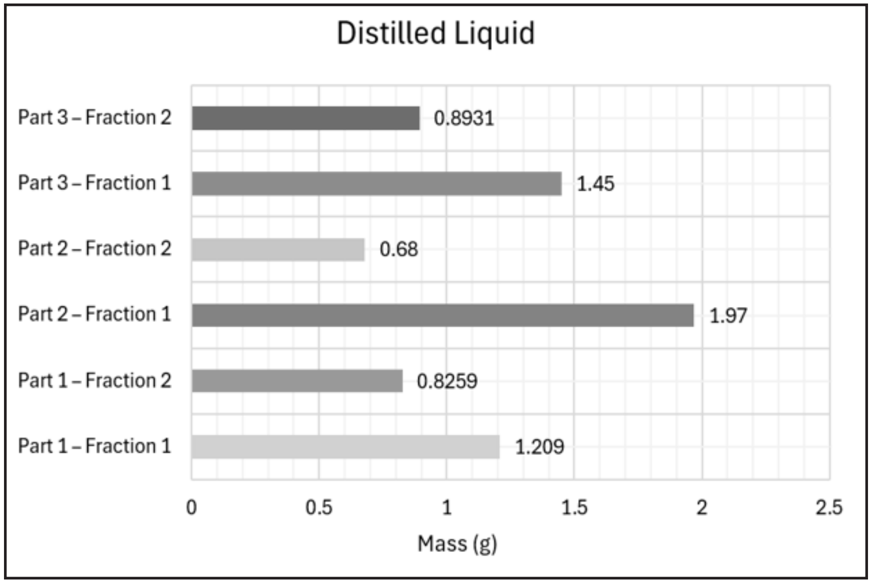
Data Analysis

1. Calculate the percent recovery of the distilled known liquids: cyclohexane, toluene, ethanol, and water.

The percent recovery of each known liquid was calculated by dividing the mass of the distilled fraction by the initial mass of the known liquid and multiplying by 100. In part 1, cyclohexane was initially measured to be 1.5001 g and, according to Sigma-Aldrich, has a literature boiling point of 80.7 °C. This corresponds to the first distilled fraction, which was observed at a lower boiling range of 65-73 °C and produced a fraction with a mass of 1.2090 g. Based on these values, cyclohexane had a percent recovery of 80.6%, indicating that most of the liquid was successfully collected during distillation despite the lower observed boiling range. Conversely, toluene was initially measured to be 1.5067 g and has a literature boiling point of 110-111 °C, which matches the second distilled fraction observed boiling near the appropriate range of 97-115 °C. This fraction had a mass of 0.8259 g, giving toluene a percent recovery of 54.8%. This lower recovery suggests that some material may have been lost during the distillation process or remained in the apparatus due to “holdup.”

In part 2, ethanol was initially measured to be 2.0016 g and has a literature boiling point of 78.3 °C. This aligns with the first fraction, which was observed at a slightly lower boiling range of 70-73 °C and produced a distillate with a mass of 1.9700 g. Ethanol therefore showed the highest percent recovery at 98.4%, indicating very efficient separation and collection. Water, on the other hand, was initially measured to be 2.0100 g and has a literature boiling point of 100 °C. This corresponds to the second fraction, which was observed at a lower boiling range of 90-91 °C and produced a distillate with a mass of 0.6800 g. Water had the lowest percent recovery at 33.8%. This is likely due to experimental error because the liquid mixture in the round bottom flask was only distilled up to 91 °C and evaporated before reaching its expected boiling point of 100 °C, resulting in incomplete distillation and collection of the fraction. Low percent recovery may also be attributed to experimental loss, incomplete distillation, or “holdup,” which remained in the fractional distillation apparatus.

Distilled Liquid	Mass (g)	Observed Fraction Boiling Range (°C)
Part 1 – Fraction 1	1.2090 g	65 - 73 °C
Part 1 – Fraction 2	0.8259 g	97 - 115 °C
Part 2 – Fraction 1	1.9700 g	70 - 73 °C
Part 2 – Fraction 2	0.6800 g	90 - 91 °C
Part 3 – Fraction 1	1.4500 g	55 -70 °C
Part 3 – Fraction 2	0.8931 g	87 - 93 °C



2. Were the distillations successful in purifying the mixtures?

The distillations were partially successful in purifying the liquid mixtures, as indicated by the separation of fractions with boiling ranges that correspond to, but deviate from, the literature boiling points of the known compounds. In part 1, cyclohexane was distilled at 65-73 °C and toluene at 97-115 °C, which were lower than their literature boiling points of 80.7 °C for cyclohexane and 110-111 °C for toluene. These wide and lower than expected temperature ranges suggest that the fractions were not completely pure and that the separation was likely incomplete, even though distillation was continued until only a small amount of liquid remained in the flask. However, the appearance of two distinct boiling ranges still indicates that the distillation process was able to separate the components of the mixture to some extent.

In part 2, ethanol was distilled at 70-73 °C and water at 90-91 °C, which were also lower than their literature boiling points of 78.3 °C for ethanol and 100 °C for water. The separation of ethanol and water is further complicated by the formation of a low boiling azeotrope at 78.15 °C, which prevents the collection of 100% pure ethanol through fractional distillation alone. While the distillation allowed the ethanol and water fractions to be separated to some extent, the lower observed boiling ranges and azeotropic behavior indicate that complete purification was not achieved.

In part 3, unknown E was separated into two fractions with distinct boiling ranges, indicating that the mixture contained two different substances. The first fraction was collected between 55-70 °C and produced 1.4500 g of distillate, suggesting the presence of a chemical with a lower boiling point. This boiling range is consistent with compounds such as acetone, which has a boiling point of 56 °C or methanol, which has a boiling point of 64.7 °C, although the wide range indicates that the fraction was not completely pure. The second fraction was collected between 87-93 °C and produced a distillate of 0.8931 g, indicating the presence of a compound with a higher boiling point. This range is reasonably comparable with substances such as 2-propanol, which has a boiling point of 82 °C, or possibly water, which has a boiling point of 100 °C. The clear gap between the two boiling ranges suggests that the fractional distillation was effective in separating the major components of the mixture. However, the relatively wide boiling ranges indicate that the fractions were likely not completely pure and that some overlap of liquids remained. Overall, the distillation of unknown E was mostly successful, as it separated the mixture into two fractions, though complete purification was not achieved. Overall, distillations were relatively successful in separating the major components of each mixture. However, the wide and lower than expected boiling ranges indicate that highly pure substances were not obtained. This was likely due to human error, experimental limitations and incomplete separation.

Post-Lab

1. What is an azeotrope? Why is it hard to separate?

An azeotrope is a mixture of two or more liquids that have a sharp boiling point, boils at a constant temperature, and has the same composition in both liquid and vapor phases. Because the composition does not change during boiling, one liquid does not become more concentrated in the vapor. Distillation is able to purify a liquid because the vapor contains more of the lower boiling liquid, allowing it to be separated from the mixture. Since this does not happen in an azeotrope, the components cannot be separated into pure substances by fractional distillation.

If a mixture of liquids form a low boiling azeotrope, that mixture will have a boiling point lower than either of the pure components, and once fractionally distilled, the fraction will be the ratio of the azeotrope, and the remaining liquid left in the round bottom flask will gradually become more pure. A common example of a low boiling azeotrope is ethanol and water, in which the distillate will be the azeotropic ratio of ethanol to water, 95.6:4.4, and what is left in the round bottom flask will gradually become pure water.

If a mixture of liquids form a high boiling azeotrope, that mixture will have a boiling point higher than either of the pure components, and once fractionally distilled, the fraction will be pure, and the liquid remaining in the round bottom flask will eventually reach the ratio of the azeotrope. A common example of a high boiling azeotrope is nitric acid and water, in which the distillate will be pure water and what is left in the round bottom flask will be the azeotropic ratio of nitric acid to water, 68:32.

2. If a fractional distillation is performed too quickly, the distillate will not be pure. Why?

Fractional distillation requires time for the rising vapor and the descending liquid within the column to reach equilibrium through repeated vaporization and recondensation. If the distillation is performed too quickly, vapor moves through the column too rapidly and does not undergo enough of these cycles to reach equilibrium. As a result, the separation efficiency decreases and the process begins to resemble simple distillation, producing a distillate that still contains a mixture of components rather than a purified compound.

3. What are the advantages of using a long column for a distillation? What are the advantages of using a short column?

A long distillation column provides more surface area, which allows the rising vapor to undergo many more cycles of vaporization and recondensation as it moves upward. This results in a much higher level of purity and a more distinct separation, which is essential when the liquids in the mixture have boiling points that are close together.

In contrast, a short column is advantageous because it is faster to set up and complete the distillation. It also minimizes the amount of "holdup," or product lost because it sticks to the glassware of the apparatus. Short columns are preferred when the components have vastly different boiling points so that one distills almost entirely before the other and does not require extensive cycling to separate.

4. If an 80:20 mixture of a 2-methyl-propan-1-ol (compound A) and propan-2-ol (compound B) is boiled, what will the relative ratios of the vapor be?

According to the phase diagram[1], a 80:20 liquid mixture of 2-methyl-1-propanol (compound A) and propan-2-ol (compound B) intersects the liquid curve at approximately 103 °C, indicating that the vapor contains approximately 66% A and 34% B.

5. Although it is often a good idea to insulate the distilling column, it is not a good idea to insulate the condenser. Why?

The distillation column is often insulated to keep the vapor hot as it rises, promoting repeated vaporization and recondensation in order to reach equilibrium, thus improving separation. However, the condenser must remain cool because its purpose is to remove heat from the vapor and convert it back into liquid. If the condenser were insulated, it would retain heat and the vapor might not condense properly, potentially escaping the apparatus as a gas instead of being collected as a liquid.

6. What would be the effect of doing a distillation at low atmospheric pressure?

Performing a distillation at low atmospheric pressure will cause the boiling points of all components in the mixture to decrease. A liquid boils when its internal vapor pressure equals the external atmospheric pressure. Therefore, reducing the external pressure allows the liquid to reach its boiling point with significantly less heat. This is particularly advantageous when distilling heat sensitive organic compounds that might decompose at high temperatures. Additionally, operating at lower pressures can alter the relative volatility of the components and can even shift or "break" azeotropic points, potentially allowing for the separation of mixtures that are impossible to fully purify at standard pressure. This process is known as vacuum distillation.

1. *Organic Chemistry Experiments, 4th ed.*; Sundermann, M. J.; Follet: River Grove, Il, 2011

Conclusion

The primary objective of this lab was to utilize fractional distillation to separate and purify liquid mixtures based on their unique boiling points. Overall, the results show that the purpose of the lab was mostly fulfilled, as each mixture was separated into two distinct fractions with different boiling ranges. In part 1, cyclohexane was collected at 65-73 °C and toluene at 97-115 °C, which corresponds to their literature boiling points of 80.7 °C and 110-111 °C. Although these ranges were lower and wider than expected, the presence of two distinct temperature ranges indicates that the components of the mixture were successfully separated to some extent. In part 2, ethanol was collected at 70-73 °C and water at 90-91 °C, compared with literature boiling points of 78.3 °C and 100 °C. The relatively high percent recovery of ethanol at 98.4% and the narrow boiling range suggest that the long fractional column provided sufficient surface area for the rising vapor and the descending liquid within the column to reach equilibrium and thereby separate the compounds effectively. However, the ethanol and water distillation illustrates the limitations of fractional distillation because the mixture forms a low boiling azeotrope. In part 3, unknown E was separated into two fractions with boiling ranges of 55-70 °C and 87-93 °C, indicating that the mixture contained two different substances. The first fraction is consistent with low boiling compounds such as acetone at 56 °C or methanol at 64.7 °C, while the second fraction corresponds to higher boiling compounds such as (E)-2-propanol at 82 °C or possibly water at 100 °C. The clear gap between these ranges demonstrates that the distillation effectively separated the major components of the mixture, even though the wide boiling ranges suggest that the fractions were not completely pure.

Several sources of experimental error likely influenced the observed boiling ranges and percent recoveries. One major factor is column holdup, which can reduce the recovery of higher boiling fractions such as toluene and water. Additionally, the recorded boiling ranges were consistently lower than literature values, which may be explained by heat loss from the distillation column to the surrounding air. This heat loss may have caused premature condensation, preventing the vapor from reaching the thermometer at its true boiling temperature. Improper thermometer placement may have also contributed to inaccurate temperature readings if the thermometer bulb was not positioned at the level of the vapor path, preventing measurement of the true equilibrium temperature of the rising vapor. Furthermore, a distillation rate that was too rapid could have prevented the rising vapor and descending liquid from reaching proper equilibrium, resulting in a less pure distillate that resembled simple distillation. Despite these limitations, the experiment successfully demonstrated the principles of fractional distillation and highlighted both the effectiveness and practical limitations of using this technique to separate mixtures of organic liquids.

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The Monster Next Door: How Joyce Carol Oates Exposes the Danger Within American Culture

Literary Analysis by
MARIANA JIMENEZ ARANCON

ENGL 1302: COMPOSITION AND RHETORIC II

Mariana's Literary Analysis examines the character of Arnold Friend in Joyce Carol Oates' 1966 story, "Where Are you Going, Where Have You Been?" She begins with strong syntax, drawing her audience into the story, inviting us to explore this all-too familiar character with her. Her thesis statement is organized and clear; Mariana argues that Oates' cautionary lesson for readers is just as appropriate today, if not more so, than it was 60 years ago. Then, she unpacks each moment of the characters' experience in the short story. She analyzes figurative language, then zooms in on Oates' portrayal of Connie and the false safety net that her beauty offers. Overall, Mariana explores Oates' motivations for writing the characters in such a way that readers become uncomfortable with the story's ending. She asks us to sit with this discomfort, heeding Oates' lesson for society today, in 2026.

- Chrisoula Gonzales

He leans against a gold jalopy, sunglasses catching the light. He knows your name. He knows your favorite song playing on the radio inside your house. He smiles the way every boy you have ever liked has smiled, and he says all the right things in all the right order. He looks, in other words, exactly like someone you have been taught to trust. This is not a description pulled from a nightmare or a horror film. This is Arnold Friend, the antagonist of Joyce Carol Oates' 1966 short story "Where Are You Going, Where Have You Been?", and the terrifying truth of his character is not that he is monstrous, but that he is not. Through Arnold Friend's deliberate fluency in the language of 1960s American pop culture, Oates argues that this culture failed young women by teaching them to fear strangers, while domestically producing the very violence embedded in their most familiar world.

To understand why Arnold Friend is so effective, it is necessary to first understand how this culture shaped Connie. From the story's opening pages, Oates establishes a world in which a young woman's worth is inseparable from her appearance and her desirability to boys. Connie's mother constantly compares her to her older sister June, who is praised for being useful and responsible, while Connie is beautiful and knows it: "she knew she was pretty and that was everything." Her two selves, one for home and one for "everywhere that was not home," reflect the performance the culture demands of her (Oates). The drive-in restaurant where Connie and her friends spend their summer nights is described with almost holy language: the girls enter "as if they were entering a sacred building that loomed up out of the night to give them what haven and blessing they yearned for." The music, always in the background, is "something to depend upon" (Oates). This is one of the most important details in the story, because it tells us that music and boys and the feeling of being wanted are the only real power Connie has access to. The culture handed her these things as substitutes for actual safety, actual autonomy. And then it sent Arnold Friend, who had carefully studied every single one of them.

Arnold Friend did not arrive from outside the culture. He was made by it. In March 1966, the same year Oates published this story, *Life Magazine* ran an exposé on a real young man named Charles Schmid, who drove around Tucson, Arizona in a gold jalopy, stuffed his boots with crushed cans to appear taller, and charmed teenage girls into trusting him before killing them. Moser's opening portrait lingers on Schmid's self-regard—the rearview mirror in his car was "turned always so he can look at his own reflection" (Moser 18), revealing a man who had constructed himself as a performance, studying his own image and enjoying the character he gets to play. The detail of the boots, the car, the designed performance of youth: none of this is metaphor. It is documentation. Arnold Friend is not a symbol of evil descending on innocence from the outside. He is a portrait of what American culture produced when it romanticized the cool older guy with the car and the good music and never asked what he wanted in return. Most critics, however, have not read him this way. As Tierce and Crafton observe, the critical reception of the story "reveals a consistent pattern for reducing the text to a manageable, univocal reading", namely, that Arnold must symbolize Satan and Connie must be raped and murdered (Tierce and Crafton 219). Scholar after scholar has insisted Arnold's feet "resemble the devil's cloven hoofs," that the story describes "an encounter with the devil," that he is a "satanic visitor" (219). The stakes of this disagreement matter. A devil is a convenient reading because a devil is an outside creature. A devil bears down on a culture, corrupts it, and can be cast out. A devil does not grow up listening to Bobby King on the radio. A devil does not stuff his boots to inflate his image. A devil does not need to study the slang. Arnold Friend is not a devil. He is a man, a specific kind of man, made by a specific kind of culture, and that is so much harder to explain away.

What makes Arnold Friend genuinely horrifying is not the moment the mask slips; it is the fact that he has a mask at all, and that society allowed to him create it. He arrives wearing the costume of normalcy with precision: tight jeans, a white pullover shirt that shows his muscles, and mirrored sunglasses. He knows Bobby King, the radio DJ Connie listens to. He speaks in the slightly mocking, slightly playful tone of every teenage boy she has ever encountered. But cracks appear. His boots, we learn, have been stuffed so that he appears taller, which Connie notices when he nearly loses his balance, causing him to snap at her before recovering his persona. His face, Oates writes, is "awkward as if he were smiling from inside a mask. His whole face was a mask." She does not use this as metaphor. She names it directly. Arnold Friend is performing normality with the exactitude of someone who has studied it from afar, who has learned which expressions to make and when to make them, and who becomes angry when the script requires improvisation. His need for Connie to cooperate willingly, to come out the door on her own, is not tenderness. It is the fantasy requiring her participation to be complete. "I'm always nice at first, the first time," he tells her; a sentence that contains within it the certainty of repetition, the certainty of other girls before her (Oates).

The most quietly devastating moment in the story is also the easiest to miss. In the final page, Arnold Friend calls Connie "my sweet little blue-eyed girl," and the narrator immediately notes that this had "nothing to do with her brown eyes" (Oates). Connie has brown eyes. She has had brown eyes since page one. Arnold Friend claims to know everything about her: her name, her family's whereabouts, her best friend Betty, how long her parents will be gone. But he does not know the color of her eyes? This is Oates being precise and tragic in a single clause. Arnold is not seeing Connie. He is projecting a fantasy girl onto her: blue-eyed, sweet, compliant, his. The real Connie, with her brown eyes and her specific, complicated, frightened humanity, is entirely irrelevant to him. She is interchangeable. And the song, the half-sung sigh, claims her anyway; even this sound "was taken up just the same by the vast sunlit reaches of the land behind him" (Oates). This is the story's argument in miniature: the culture produced a script, complete with its music and its language and its fantasies of what a girl should be, and it does not matter whether the real girl fits it. She gets absorbed regardless.

As Arnold tightens his grip on the conversation, something horrifying happens to Connie's relationship with the world around her. The house she has lived in for three years begins to feel foreign. The kitchen "looked like a place she had never seen before." Her own body stops belonging to her. Her heart feels like "a pounding, living thing inside this body that wasn't really hers either" (Oates). Near the end, she watches herself push open the screen door as if observing someone else from a great distance. This is the mundane horror that Oates has been building toward from the story's first line. The danger did not arrive in a dark alley or a gothic castle. It arrived on a Sunday afternoon in a gold car, in the bright open sunlight, on a gravel driveway in front a house and family at a barbecue three miles away. And because it arrived wearing the face of the familiar, Connie has no framework to name it, no script for resistance, no door that actually locks. The screen door—just a screen door, the most ordinary domestic boundary imaginable, is the only thing standing between her and what is coming, and they both know it cannot hold.

The story's dedication, "for Bob Dylan," is not decorative. Dylan's songs frequently employed the voice of a knowing older figure speaking to a young woman with an air of beautiful inevitability, the sense that she has no choice but to follow where the voice leads. Arnold Friend speaks in exactly this register, and Oates gives us the moment Connie begins to hear it for what it is. As Arnold presses her, his words come out with "a slight rhythmic lilt," and Connie recognizes them as "the echo of a song from last year" (Oates). This is a crucial moment. She cannot name what she is feeling, but something in her registers that his script is borrowed; that the gentleness is a performance learned from a song, not felt by a person. Moments later she watches him recite slang "as if he were running through all the expressions he'd learned but wasn't sure which of them was in style" (Oates). The mask is slipping. He is not a boy. He is someone who studied how boys sound, the way he studied everything else about her world, and for the first time Connie can feel the gap between the performance and the person behind it, even if she has no language for what that gap means. Oates dedicated the story to Dylan because she borrowed his voice to build her villain. But where Dylan's inevitability reads as poetry, Oates strips it down into a script a predator memorized from the same radio Connie trusted like a church.

What Oates understood in 1966, and what still unsettles me about this story, is that the monster does not look like a monster. He looks like the system that raised both of them. He speaks its language, drives its cars, plays its music, and wears its clothes. The danger was never imported from somewhere dark and unfamiliar. It was domestically produced, raised on the same radio stations and drive-ins and mythology of teenage freedom that shaped Connie and every girl like her. And the culture never gave her the vocabulary to name it, which is why I keep coming back to the blue eyes. In the final moment of the story, as Connie walks out the door toward whatever is waiting for her, the narrator quietly reminds us that she has brown eyes, even though Arnold Friend calls her his "sweet little blue-eyed girl." Arnold Friend does not want Connie. He wants a body to complete his fantasy: beautiful, docile, inert. Connie, with her brown eyes and her inevitable humanity, was never part of the equation. She could have been anyone. The culture produced the fantasy first, and then it produced the girl to fill it, and Arnold Friend simply showed up to collect. That is the most chilling thing Oates leaves us with: not that a monster found Connie, but that the fantasy was never about her at all. She was merely a vessel. That is not evil from outside the world. That is what the world made.

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The Orchestration of Banks' Power Through Indispensability and Strategic Survival

Research Paper by
JACOB KWIATKOWSKI

ENGLH 1302: HONORS COMPOSITION AND RHETORIC II

For our honors research paper, students apply scholarly concepts of power to their examination of texts on a topic connected with their major. Jacob's paper moves through the research arc by establishing a research question, conducting a review of existing literature, and running a focused analysis. Jacob sets up a clear basis for inclusion in the selection of two financial institutions for comparative analysis, Goldman Sachs and Lehman Brothers, which held similar levels of assets and influence at the start of the Great Recession. In the analysis, Jacob compares the decisions made by these institutions when faced with financial crisis, adding causal analysis as he examines the outcomes of specific trade deals and approaches. The unique combination of academic language and creative diction highlights Jacob's voice in the writing. Each section of the paper is grounded in textual evidence and developed with critical thinking connected to the research question, resulting in a project that provides insight into institutional power.

- Haley Stoner

Abstract

With an aim to understand how major financial institutions exercise power, this research examines the divergent trajectories of Goldman Sachs and Lehman Brothers during the Great Recession of 2007 to 2009. Goldman Sachs and Lehman Brothers, two of the most systemically significant investment banks of the early twenty-first century, serve as the empirical anchors of this study. Scholars have disputed the origins of institutional power, with Diamond and Rajan (1999) locating it in the disciplinary force of financial fragility over borrowers, and Norden et al. (2013) and Schwert (2018) countering that capital adequacy and state-backed stability constitute the more durable foundation of institutional authority. However, neither of these positions fully accounts for how institutions deliberately construct their own indispensability, nor how that engineered position becomes a mechanism of market power. Previous studies demonstrate that fragility disciplines borrowers by limiting renegotiation, that banks deliberately take on shared risks when they anticipate a bailout, permeating this logic into the shadow banking system, where private liquidity arrangements generated the contagion that compelled state intervention. Through a comparative analysis drawing on the Financial Crisis Inquiry Commission report, institutional records, and scholarly literature spanning financial economics and financial markets, this research demonstrates that Goldman Sachs engineered indispensability by embedding itself into the architecture of state-backed liquidity, transforming vulnerabilities into institutional power, while Lehman Brothers compounded every exposure until collapse became inevitable. Ultimately, bank power is not accidental. It is constructed through systemic entrenchment and exercised through informational dominance, whereby institutional order flow is executed before the rest of the market is aware—leaving competitors perpetually reactive.

Introduction

Large financial institutions are the vital infrastructure of modern economics, orchestrating liquidity and credit in ways that determine whether industries expand their power or contract it. When that infrastructure falters, the ramifications can lead to an entire institution's demise. The Great Recession of 2007 to 2009 laid this reality bare, exposing the fragility beneath institutions that appeared impenetrable and simultaneously demonstrated how contemporary finance can unravel with terrifying speed. Vast quantities of capital in mortgage-backed securities collapsed, credit markets froze, and the stark differentiation between an investment bank that survived and one that did not, revealed that survival did not come from sheer market value and size alone, but from the depth of systemic entrenchment. The crisis exposed how radically different the fates of two apparently comparable institutions could be. Goldman Sachs, one of the most storied investment banks in American history, emerged from the wreckage more deeply entrenched within the financial system than before. Lehman Brothers, its peer in scale and prestige, ceased to exist completely. That divergence demands explanation, and it is one that institutional size alone cannot provide. During this volatile period, Goldman Sachs converted itself into a bank holding company on a single Sunday and secured Federal Reserve liquidity. Conversely, Lehman Brothers, despite carrying $600 billion in assets, collapsed without a bailout.

Scholars have long debated the origins of institutional bank power. Kyle (1985) demonstrated that informed traders exploit monopolistic information advantages under the concealment of aggregate order flow, moving markets before competitors can even react. Diamond and Rajan (1999) argued that fragility, exemplified through disciplining borrowers with a credible threat of depositor withdrawal, is a source of power. This fragility thesis was challenged entirely by Schwert (2018), who found that it is capital adequacy that sustains lending relationships during downturns. On the contrary, Gorton and He (2008) demonstrated that banks compete through privately held information, generating credit cycles that shape broader economic conditions. Yet, none of these frameworks express how these institutions deliberately construct their own indispensability, nor how that engineered position becomes a mechanism of information dominance in financial markets.

This divergence will be examined through a comparative analysis of Goldman Sachs and Lehman Brothers during the financial crisis of 2007–2009. Goldman Sachs transformed vulnerability into a structural entrenchment, positioning itself within the architecture of state-backed liquidity through deliberate accumulation of systemic indispensability. Lehman Brothers did the opposite. Lehman Brothers's reckless accumulation of risk annihilated the very confidence that might have saved it. Kyle's (1985) framework, constructed decades prior, describes a mechanism of informed trading that is structurally timeless: the gradual, concealed incorporation of private knowledge into prices through aggregate order flow. It is precisely this system that institutional order flow data from 2007 makes legible.

To examine this, the paper draws on primary source documents including the Goldman Sachs Annual Report 2008, the Lehman Brothers Annual Report 2007, and the Financial Crisis Inquiry Commission Report, alongside institutional order flow data. These documents are read through the theoretical frameworks of Kyle (1985), Farhi and Tirole (2009), and Gorton and Metrick (2010), applying comparative and textual analysis to trace how each institution exercised, or failed to exercise, the power their structural position afforded. The analysis proceeds chronologically and inevitably reveals why the Federal Reserve chose to rescue Goldman Sachs alone. Ultimately, this paper finds that bank power is neither accidental nor purely structural; it is deliberately engineered through systemic entrenchment and subsequently exercised through informational dominance that operates before the rest of the market can even respond.

Critical Literature Review

Scholars locate a primary source of institutional power in financial fragility. Diamond and Rajan (1999) pinpointed a paradox within banks' balance sheets; they accentuate that both investors and borrowers are vexed with liquidity. This mismatch Diamond and Rajan exposed thus resides at the core of financial fragility and insinuates that tension is wrought within banks' daily operation (p. 3). Since banks owe depositors on demand, they must also lend the same cash to projects that cannot be liquidated overnight. Yet Diamond and Rajan theorize that fragility is of utmost importance, which thus becomes a desirable characteristic of a bank, since it mitigates the borrower's leverage to renegotiate. To be specific, borrowers cannot credibly vow 100% of future profits, so this limitation inevitably offers leverage to the borrower. However, the threat of depositor withdrawals grants the bank discipline and prevents the borrower from easily restructuring loans (p. 3). This interpretation is not without its limits, however. Hellmann, Murdock, and Stiglitz (2000) demonstrated that liberalization and competition can erode the very prudence that fragility is supposed to enforce, finding that capital requirements alone may not prevent gambling incentives when franchise values decline (p. 149). The privilege of disciplining borrowers through fragility may, under competitive pressure, devolve into an incentive to gamble rather than govern. Furthermore, this privilege of granting institutions discipline may exacerbate peril under competitive pressure, and empirical evidence further confounds this fragility thesis. Schwert (2018) found that bank-dependent firms borrow from well-capitalized banks and that such banks reduced lending less sharply during downturns, suggesting that capital strength, not vulnerability, stabilizes credit provision (p. 788). Such studies unveil a foundational divide within literature: whether bank power is derived from credible exposure to liquidity runs or from resilience reinforced by oversight.

If bank fragility disciplines individual borrowers, its power cannot simply end there. Scholars found that banks exercise power beyond individual borrowers, engineering cycles of credit contraction and expansion through strategic manipulation of privately held information. Pinkowitz and Williamson (2001) demonstrated such through scrutinizing industrial firms in the Japanese banking system, where bank relationships are synonymous with considerably higher corporate cash holdings (pp. 1062–64). In this sense, the lending relationship extends beyond capital provision into internal governance, in which banks shape firms' precautionary liquidity behavior. Pinkowitz and Williamson found that this relationship bank premium on cash holdings was significantly larger in Japan than in either the United States or Germany, suggesting that the disciplinary reach of bank relationships intensifies precisely where the institutional power is most concentrated and least contested (pp. 1062–1064). Yet Schwert (2018) complicated this by demonstrating that the durability of such governance depends on capital adequacy—a measure of a bank's financial health which represents its ability to absorb abrupt detriments. He finds that bank-dependent firms systematically correlate with better capitalized banks and that institutions experiencing negative capital shocks lessen relationship lending more sharply, indicating that sustained influence over borrowers is contingent upon balance sheet resilience (pp. 788–90). Consequently, this dependence becomes even more visible during a crisis, as Norden et al. (2013) showed that corporate borrowers experience positive, abnormal returns when their relationship banks received government capital infusions, suggesting that markets value the stabilization of lending institutions (p. 1636, 1658). Authority within lending relationships thus appears less a product of fragility than of capital stability reinforced by implicit or explicit state backing. This thus strikes at the heart of how banks construct durable power and transform the lending relationship into an instrument of institutional dominance.

This governance outreach extends even further still: banks engineer broader credit cycles through strategic manipulation of privately held information, molding macroeconomic conditions that no single borrower can ever anticipate. Gorton and He (2008) suggested that bank competition creates what they call endogenous credit cycles that occur by strategic behavior in the banking sector (pp. 1181–82). In this framework, banks compete through the intensity of their information production—the degree to which they screen and evaluate borrowers (p. 1183). Since these standards are private and hidden from competitors, banks respond to each other strategically, adjusting behavior based on inferred performance (p. 1184). Widening performance gaps trigger what Gorton and He term a 'punishment phase,' a deliberate tightening of screening intensity to defend market position (p. 1195). This credit contraction thus becomes a competitive strategy and is able to shape macro conditions. This strategic manipulation of credit conditions acquires even greater significance when institutions anticipate collective support during a crisis (Urban et al., 2022, p. 1609). Furthermore, this private governance of credit standards is the foundation from which informational dominance over markets is built.

To read the rest of this article and its References, please visit
https://lscmontgomerycac.com/2026/jacob-kwiatkowski/

The Hero Twins: How a Ball Game Restored Balance

Essay by CASSANDRA MENDEZ-DELCID

ENGL 1302: FRESHMAN COMPOSITION AND RHETORIC

For this assignment, students were to choose a folktale from another country and research its history and the lessons the tale imparts. Cassandra integrates her research into her discussion of the history of the tale and its cultural relevance. She structures the essay well and explains how the lessons of the story remain important to all people, not just to ancient Mayan people.

- Wendy Hanks

Imagine being a direct descendant of a tree and a princess, and now you have to defeat your grandfather in a ball game to avenge your father and uncle's deaths. The Hero Twins prosper where their father and his own twin failed because they were clever, well-spoken, and courageously thought outside the box even when the challenge seemed bigger than themselves. The Mayan folktale of the Hero Twins is a story of birth, death, and resurrection that contains multiple lessons that speak to the culture of the Mayan people and their descendants even today.

According to the Popol Vuh, the ancient text of Mayan mythology, the Hero Twins father and his twin, Hun (one) Hunahpu and Vacub (seven) Hunahpu, known as the "first twins," had played a ball game of Pok ta Pok too loudly directly above the underworld, disturbing the gods of evil. The gods challenged the twins to a game of their own but set traps that the first twins succumbed to unfortunately. A calabash tree then grew out of the tomb of Hun Hunahpu. One day, Princess Ixquic, daughter of Xibalba, the lord of darkness, approached the tree and the head of Hun Hunahpu spat in her hand and impregnated her with the Hero Twins. When they grew up, the Hero Twins found themselves facing the same challenge their father once had, except they succeeded in their journey. Before defeating the gods of evil, they dressed as sorcerers to entertain them. They then convinced the gods to perform a trick on them that would resurrect them after they were sacrificed. After the twins were resurrected, Xibalba begged for mercy after witnessing the other gods' fall, which caused his subjects to repudiate him as king. The Hero Twins then stripped the gods of their evil powers and spared their lives, including Xibalba. As a result, the Hero Twins transformed into the sun and moon to become cosmic protectors ("Mayan Gods"). The significance of this tale illustrates balance restored through change rather than destruction while overcoming death through intelligence rather than force.

One of the biggest themes of this tale's folklore is rebirth. Whether it is Hun Hunahpu's resurrected tree form, the recurring legacy of twins, the resurrection of the Hero Twins, or the Hero Twins' cosmic new shapes, the many examples throughout the plot mostly display either new beginnings or continuation. The underlying use of rebirth also illustrates growth in a culturally significant matter: agriculture. Agriculture is a significant part of Mayan culture, vital to the survival of their civilization. The Popol Vuh contains numerous Mayan legends, including that of the Hero Twins, that outline the creation of the world. According to the Popol Vuh, humans were apparently created out of maize dough (corn/corn dough), which also happens to be a staple in Mayan culture with a heavy symbolization of their connection to the earth (Sian 1). Rebirth is a recurring theme because evolution and change are heavily emphasized in Mayan philosophy because those themes metaphorically represent the cultivation of popular crops farmed in Central America. In the Hero Twins story, the Twins are sired by the calabash tree that grew from the head of their father. The connections between the people and the earth are given a central place in the story. As the roots of humans are interconnected with the earth, this gives the mundane human experience divine purpose through modern rituals, ceremonies, art, and casual practices still celebrated today. These practices embrace change in the environment in a culturally emphasized manner with a lasting impact.

There are other messages in the tale as well, such as the power of using knowledge to overcome obstacles. The Hero Twins can inspire many individuals to rise above their mundane human experience and use duality as well as their intelligence to solve problems. Besides the obvious duality of light forces versus dark forces, duality is apparent in the tale through the compare and contrast of intelligence and trickery in the legend. For example, although the gods of the underworld had the advantage of brute force, they tricked the first twins, unethically allowing the gods to win. Yet, the intellect of the Hero Twins led them to victory as they counter tricked their much greater opponents and turned slim chances into full victories. According to Ze Manel Santos, "The duality reflects a central theme in Mayan philosophy, emphasizing that true power lies in the harmony of both qualities." This means that real strength does not come from choosing one trait over the other, but rather from using both to work together. Furthermore, knowledge is also highly valued beyond simple curiosity in Mayan culture, and "... is seen as essential for understanding oneself and one's place in the universe" ("7 Key Principles "). This ultimately means that the lessons of the Hero Twins go beyond practice, smarts, or skills. Spirituality is interlinked to knowledge as a sacred pursuit, which is how the gods of the underworld succumbed to their own game because the Hero Twins used their knowledge masterfully.

Another theme that is revealed within the Hero Twins' legend is cosmic balance and restoration through transformation. Again, there are many examples of rebirth, but transformation is a bit more of a subtle theme. It is especially emphasized when the twins gain their sun and moon form, but an even bigger transformation as a result of their victory was how the twins evolved the whole realm rather than destroying it entirely. They intentionally spared everyone, including Xibalba himself, and merely stripped them of ill-intended powers because the Hero Twins did not find themselves in need of rebuilding the realm. This leaves an emphasis on restoration of equilibrium and balance without any brute force, because "achieving harmony can lead to healthier relationships within ourselves, our communities, and with our planet" ("7 Key Principles "). This further explains why the twins were given cosmic forms as the sun and moon. These eternal forms let them infinitely overlook the societies they created after restoring balance, allowing them to create relationships with the new civilizations after having passed down their tale. The importance of their tale can be seen in rituals still currently in use today through the use of the Hero Twins' names in chants or calls for protection (Clemente 1). Overall, the Hero Twins story signifies how Mayans believe in balance rather than destruction and in restoration through transformation.

The Mayan legend of the Hero Twins embodies universal themes of rebirth, duality, and balance that still stand strong in Mayan culture and philosophy today. The twins are complementary figures that represent opposing yet interconnected forces such as life and death, light and dark, and brains and brawn. This illustrates the harmony that arises not from likelihood, but from getting in tune with differentiation. Their trials and tribulations during their journey in the underworld highlight how the circle of life is connected to the nature of existence, meaning death is not the end but a primary step towards starting over. Because of the twins' sacrifices, transformation, and triumph, the twins represent rebirth, reinforcing the idea that the circle of life regenerates itself in new forms. Additionally, their ability to intellectually overcome the lords of the underworld reestablishes cosmology in Mayan culture, highlighting how important balance is between realms and forces. Although keeping balance is not always easy, it can be consistently maintained through wisdom, cooperation, and resilience. Thus, the folklore of the Hero Twins is more than just a culturally significant tale but mirrors a deeper philosophical representation of how converse elements can not only peacefully coexist but can also gracefully unite to sustain the universe.

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An Ordinary Pull: Reclaiming Dignity Through the Execution of a Task Well Done

Literary Analysis by
NIZA MORENO DE LUNA

ENGL 1302: COMPOSITION AND RHETORIC II

In her Literary Analysis, Niza Moreno de Luna employs a compare and contrast method to dissect Marge Piercy's 1973 poem "To be of use" alongside a 2019 Netflix series: Love, Death & Robots. Niza examines two interviews with Piercy that elicit the poet's "why?" and she uses those discoveries to make sense of the writing of a particular episode of Love, Death & Robots. Niza explicates Piercy's poem with ease; she focuses on diction and tone, using the poet's dialogue in interviews to justify her conclusions. She also provides readers with an organized, thoughtful summary of episode 14 of the Netflix series so that we can follow along with her analysis of both works. Niza's writing voice is engaging, emphatic, leaving readers wondering just how often literature serves as inspiration for the media we consume today.

- Chrisoula Gonzales

In a society increasingly obsessed with fleeting pleasure, vain aesthetic, and performative productivity, Marge Piercy anchors "hard work" at the very core of an individual's pursuit for meaning. It is in everyday hassles that a person truly dives into the substance of life rather than remaining in the shallow depths of external recognition. While contemporary culture has tirelessly fabricated a single-use policy around the idea of almost everything—including work—this poet and the fictional character, Zima, prove that the routinary execution of duty is essential for true fulfillment. Correspondingly, Zima's search for truth is rooted in the integral humility natural to *being of use*. From common mud to blue tiles, Piercy's "To be of use" and Netflix's *Love, Death & Robots* episode, "Zima Blue," collectively assert that purpose and dignity are forged by submerging oneself in the simple, yet functional pull of labor.

Piercy's definition of purpose begins with the total immersion of the individual into aquatic metaphors that adequately describe how "[jumping] into work head first" is a foundational element of character. This is particularly evident in her declaration of a worker that becomes "native" to an *element*. Her diction invites a dual interpretation: the element may literally reference the water from the extended metaphors, or it may serve as an analogy for vocation—evoking the familiarity of "being in one's element" while executing a mastered task. The third secret option is that she is taking advantage of the word's connotations and poetry's inherent license for ambiguity to address both definitions simultaneously.

The semantic co-occurrence in the first stanza of the poem suggests that vocation does not imply a career path, but rather the sense of belonging that comes from dwelling in one's native environment. The former provides a critical link within the unconstrained ease with which a seal swims in its natural habitat and that of a cleaning robot's original craft. This builds into a potent visual parallel between "To be of use" and the fourteenth episode of *Love, Death & Robots*—a short film that traces the arc of a public figure who abandons the temptation of external recognition to reclaim his elemental nature. While the poetic voice presents to us a faceless trait that endows a person with social and personal value, in "Zima Blue," the narrator introduces a clear protagonist that goes to the most extreme lengths to reach fulfillment. "Zima Blue" tells the story of an exceedingly successful visual artist who started his career in portraiture but soon tires from the human form, which he deems an insufficient source of inspiration, unworthy of attention. We first know about him through a third-person point of view—a journalist who he invites to his house for an interview, much as Piercy does by having John Rodden over at her very home. Without delay, the viewer is introduced to the fact that Zima underwent surgery to integrate robotic parts into his body with the sole purpose of experiencing life at its alleged full potential.

Similarly, journalist and critic John Rodden questions Piercy about her life, political views, and literary career. In the interview, we acquire valuable biographical context about how she was born into an ethnically diverse working-class family in Detroit during the 1930s. By this, we get a sense of how her background profoundly influenced "To be of use," both as a title and as a recurring topic in her writing. From there on, the interview alludes to the symbolic and literal intersections between Piercy's life and her work. As it turns out, several responses allowed a broader understanding of what makes a person serviceable under her denotation of 'being of use.'

For instance, she mentions that, to her, poetry is political and that the main reason why people would determine a text or an opinion as non-political largely depends on the use they can have for it. In this sense, she explains that the real motive behind the politicization of a literary piece lies heavily on just how much they can utilize it to support their own beliefs. Consequently, this is how individuals fall prey to a collective form of confirmation bias, an aspect under which social media undeniably operates and greatly benefits from. In her own words: "If the attitudes expressed or implied are different, then it is seen as political or even polemical" (Rodden 134). In that manner, poetry gains another value beyond mere entertainment, by becoming useful in its own right. Thus, it turns into a means of exposing the audience to other viewpoints on themes of public concern, in the hope that they may gain a broader perspective and exercise their critical thinking through rhyme and verse. In that way, usefulness is more than an acknowledgment of human endeavor, but a politically grounded statement about how it undeniably contributes to a meaningful life.

On another note, when Gary Pacernick directly asks whether the poem's primary intention is to praise workaholics, Piercy resists the insinuations of the question by identifying herself as a non-hierarchy maker and a naturally devoted pluralist (Piercy and Pacernick 83). She is not concerned about categorically ranking labor, but about the humbling effect it has on people. She then reasserts the deep respect she has toward arduous work since her childhood—long before society privileged celebrities and superficial beauty over ordinary labor (Piercy and Pacernick 84). These concepts are also present in the last stanza of the poem, in which the reader is introduced to a central idea "the work of the world is common as mud."

Through this phrasing, labor's aim is not to be attractive, or socially noteworthy, but plainly useful and unpretentiously sedimental. Soon after, Piercy goes on to encompass an object's utility wasted to archival exhibits on museums, similar to the futile posting of one's "efforts" in any social media's display case.

As can be seen, in "To be of use" the author utilizes the imagery of museum amphoras and vases to illustrate the underlying dignity of having a primal purpose; Zima himself takes this idea to the radical degree of turning himself into the actual vessel for this realization. Despite his mechanical enhancements—the biological modifications that made him able to see in ultraviolet and endure extreme environments like magma—Zima soon finds these hyperbolic efforts to be nothing but hollow. He discovers that his "search for truth" is not found in indulging himself in the vastness of the cosmos, but in the specific, cerulean blue of a single tile from the swimming pool where parts of him were born for. Much like Piercy's pitcher that "cries for water to carry," Zima's android mind demands the "simple function" for which he was originally designed. In his final artistic performance, he does not present a new senseless masterpiece. Instead, he visibly dismantles his complex identity by stripping away all robotic limbs until he is once more a basic pool-cleaning machine. By returning to the physical task of scrubbing tiles, Zima rejects the vanity of fame provided by the art world to reclaim his *common mud*, the raw foundation of his initial, functional purpose.

Lastly, both artworks circle around the idea of simplicity as a means for immeasurable grandeur. Interestingly, "Zima Blue" closes with the artist's own quiet declaration: "(...) to extract some simple pleasure from the execution of a task well done. My search for truth is finished at last" (Gelatt 8:24 – 8:29). Piercy, decades earlier, arrives at the same notion through verse: "But the thing worth doing well done / has a shape that satisfies, clean and evident." In both cases, the end is not superfluous glory but the modest satisfaction of doing that for which one was engineered. Together, they propose that meaning is found within oneself, built inside out, through the patient and constant surrender to a task that is properly carried out. For a culture that has grown worryingly fluent in the performance language, where worth is measured by media traffic and work is only recognized through social exposure, some piercing verses and cerulean lines offer a unique vocabulary altogether. Perhaps the water buffalo pulls, the robot cleans, the poet writes, and the student delivers without need of honorable mention, in the one element they were all intended for.

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Gemini, The Artificial Companion: A Rhetorical Analysis of Google's "New Home" Commercial

Rhetorical Analysis by XUAN NGUYEN

ENGL 1301: COMPOSITION AND RHETORIC

In his rhetorical analysis of Google's 2026 Super Bowl commercial "New Home," Xuan examines how Google uses storytelling, symbolism, and repetition to promote Gemini while addressing growing public skepticism toward artificial intelligence. His thoughtful synthesis of demographic data, public opinion research, and scholarship on artificial intelligence strengthens his analysis by explaining how the commercial's rhetorical choices respond to its broader cultural context. Particularly noteworthy is his discussion of the tension between Google's optimistic message and research that suggests artificial intelligence may negatively affect critical thinking. Xuan's insightful analysis, thoughtful synthesis, and exceptional depth of research distinguish this essay as an outstanding achievement in both rhetorical analysis and advanced scholarly research.

- Kirk Cochran

As one of the groundbreaking inventions, artificial intelligence is developed conceptually from how the human brain sends signals through neurons. The fascination and complexity of this technology make it seem to emerge from a science fiction world. With the development of large language models, artificial intelligence marked the beginning of a new era in 2020 by gradually blending into human life ("History of Artificial Intelligence"). At the frontier of the era, Google, a well-known "American multinational technology" company, leads the artificial intelligence revolution with their dominant model officially released in 2024, Gemini ("Google"; "Google Gemini"). Additionally, a report conducted in 2025 highlights that the performance of leading artificial intelligence models started to converge between 2024 and 2025 ("2025 AI Index Report"). Consequently, this closing gap has further intensified the competition in developing artificial intelligence technology among leading countries and companies. In addition, Kennedy et al. show that half of all Americans in 2025 felt concerned about the increased use of artificial intelligence in daily life, which highlights how public views remain considerably negative toward this technology despite its rapid growth ("How Americans View AI"). According to Kennedy et al., the awareness of artificial intelligence among U.S. adults in 2025 continued to grow compared to previous years ("AI in Americans' Lives"). This trend suggests that the world has witnessed a historical shift in human digital technology. As a result, Google captured this opportunity to launch a commercial named "New Home" during the Super Bowl 2026 to promote Gemini and address the challenges in public views. In their heartwarming commercial for young tech-savvy adults, Google narrates the story of a family moving to a new home, associates their product with freedom, and repeats the action of prompting in Gemini AI in order to evoke feelings of joy, cultivate creativity, and emphasize the reliability and usefulness of their product.

In the commercial "New Home," Google starts a story of a mother and a son with an action of prompting Gemini to show photos of their new house in Glenville (Google 00:00:02- 00:00:10). The mother uses Gemini to visualize her son's new room filled with things from the old house, change the color of the room, and add a dog bed to the room (Google 00:00:12- 00:00:29). After the mother prompts Gemini to show old photos of her garden, a flashback appears and stirs up the family's memories (Google 00:00:39-00:00:51). The commercial ends cheerfully with a generated image blending into a scene of the family's new yard, where the son is playing joyfully with his dog (Google 00:00:52-00:00:57). By utilizing storytelling in their commercial, Google subtly evokes feelings of nostalgia mixed with joy and warmly elevates close family ties through the narrated story of a family moving to a new home. Although anecdote is an option for this commercial, it limits Google's power to freely modify the content to fit the rhetorical situation. Furthermore, an anecdote's credibility is based on its author's reputation and knowledge. By considering those restrictions, storytelling becomes a better choice in this situation because it allows Google to create their own story's content and context, which helps deliver their message effectively to achieve their purpose. Moreover, according to Kumar, over half of Gemini's users in 2026 are in the age group of 18 to 34 years old and are mostly male, which suggests that the main audience of this commercial is young tech-savvy adults. Martin et al. also show that the average age of U.S. mothers that have children were around 25 to 34 years old in 2024, which cover a large section of the female audience (2). Therefore, Google features a mother with her son in their heartwarming story to directly resonate with the audience and draw more attention from female young adults to their product.

To properly guide the audience into the story, Google opens the beginning with a conversation between the mother and the son after the mother prompts Gemini to show photos of their new house in Glenville (Google 00:00:02-00:00:14). When the son first sees an empty room in the list of photos, he seems to doubt that it is his room and asks his mother for clarification. After knowing that his new room is empty, the son expresses an uncomfortable reaction, which reflects a general sense of anxiety and discomfort when facing major changes in life (Google 00:00:13-00:00:14). Additionally, the mother places the image of the new empty room closely next to an image of the old stuffed room in Gemini (Google 00:00:13-00:00:15). This juxtaposition between the new room's soulless appearance and the old room's personal appearance highlights the contrast between unfamiliarity and familiarity. Furthermore, by showing photos of the family's old garden, Gemini drives the story toward the past and evokes a flashback that stirs up the family's precious memories of their time living at their old home (Google 00:00:45-00:00:51). Through the flashback, Google expands the story's context toward the past to subtly evoke feelings of nostalgia that strongly resonate with young adults who have experienced moving to a new home. By highlighting the mother's nurturing love for her son, the flashback vividly elevates family cherished values and unmeasurable bonds, which makes the story more engaging and meaningful. After extending the story toward the family's precious memories in the past, Google shifts the timeline toward the future, where the new house is completely transformed into a new home. As the story reaches its climax with the timeline's shift, the commercial ends with a scene of the son running and playing joyfully in the new yard (Google 00:00:53-00:00:58). Through the son's happiness and the new yard's landscape, Google vibrantly illustrates the family's peaceful life after overcoming challenges to make a new house their true home.

By using storytelling to elicit feelings of joy and peacefulness, Google effectively shapes and strengthens the commercial's heartwarming tone. As a result, the tone combined with feelings of joy in those moving scenes perfectly highlights the endless love and dedication of the mother in nurturing her family. Moreover, by choosing a heartwarming tone for their commercial, Google effectively shapes their appearance as an openhearted, empathy, and close person who openly shares their emotional story with the audience. This persona further strengthens Google's trustworthiness and enhances the effectiveness of the appeal to nostalgia, which helps Google deliver the commercial's message more effectively and emotionally. Additionally, according to Kennedy et al., half of U.S. adults in 2025 said artificial intelligence would worsen the ability to form meaningful relationships ("How Americans View AI"). This statistic suggests the motivation behind Google's chosen tone and persona to emphasize the ways Gemini helps nurture the family's new home, foster their relationships, and evoke their treasured memories. As a result, Google successfully illustrates the positive correlation between Gemini and families' meaningfully close ties to shift skeptical views toward more positive perspectives. Ultimately, through the characters' actions and conversations, Google successfully establishes a complete context for the story, evokes feelings of nostalgia, and guides the audience from a sense of unfamiliarity to a warm ending at the family's new home.

In order to highlight how Gemini can gently cultivate creativity and personality, Google associates Gemini with freedom through scenes of it helping the family customize their new home creatively and personally. Each time the son sees his ideas turn into real images through Gemini, his creativity is inspired and encouraged, which motivates him to ask his mother to make his room blue, place his dog's bed in the room, and add a trampoline to the yard (Google 00:00:19-00:00:33). The son's actions and expressions emphasize feelings of excitation and curiosity when being able to easily visualize ideas through Gemini, which highlights how Gemini can inspire, encourage, and support new creative ideas. In addition, with Gemini's help in visualizing ideas, the son actively and confidently suggests placing a trampoline in the new yard. This shows that he becomes more confident in conveying his opinions and thoughts. By focusing on how the son freely shares and applies his new ideas to personally customize his new home, the commercial emphasizes the significant importance of freedom in developing creativity, personality, and confidence. Furthermore, by associating Gemini with freedom, Google highlights how their product can stimulate that development in the audience.

To read the rest of this article and its Works Cited, please visit https://lscmontgomerycac.com/2026/xuan-ngyuen/

The Safety of Aviation

Research Paper by MASON PARK

ENGL 1302: COMPOSITION AND RHETORIC II

In his paper, Mason combines his knowledge of the aviation industry with research to persuade a general adult audience that air travel is safe. He not only calculates accident rates for the reader, he also converts opaque statistical data into easy-to-understand comparisons. Readers who think a road trip is safer than a plane ride will be dissuaded of that notion. Mason's research paper is a prime example of a rhetorician's goal: to reach his audience and achieve his purpose.

- Joanne King Gonzalez

Airliners are a relatively new form of transportation compared to staples like cars, trains, and boats, and this can sometimes cause distrust. There are also aircraft accidents posted all over the news and social media. However, a person is 620 times more likely to die in a car accident than a plane accident (International Civil Aviation Organization [ICAO], 2025, pp. 6–8; National Safety Council, n.d.). This statistic may seem shocking, but in context of the extensive safety measures of the aviation industry, it seems more than reasonable. Aviation in the United States is classified into multiple areas or *parts*. The part that covers most major airlines is Part 121. Flights under this part are highly regulated and generally safe due to strict federal regulations, rigorous pilot training, and advanced aircraft engineering, despite some negative public perception.

The National Transportation Safety Board uses specific terminology when discussing the safety of air travel. An aircraft *accident* is an occurrence in which, between the boarding and disembarkment of the aircraft, a person is seriously or fatally injured, or the aircraft receives substantial damage (National Transportation Safety Board [NTSB], 2020). A *fatal injury* is when someone receives an injury that causes death within 30 days, and a *serious injury* is when an injury either requires hospitalization for more than 48 hours, results in the fracture of bone, causes severe hemorrhage, involves organ damage, or burns more than 5% of the body (NTSB, 2020). *Substantial damage* is damage which adversely affects an aircraft's structural strength, flight characteristics, performance, or requires major repair (NTSB, 2020). These standardized definitions ensure accuracy and consistency in discussions regarding aviation safety and allow for accurate risk analysis.

Statistically, the chances of being on a flight in which an accident occurs are low. In 2024, about 37 million flights departed globally under Part 121, carrying about 4.5 billion passengers (ICAO, 2025, p. 6). Of these millions of flights, there were a total of 95 accidents with only 10 having fatal injuries, leading to a total of 296 fatalities (ICAO, 2025, p. 6). From this data, the accident rate is 2.56 per million flights, and the fatality rate is 65 per billion passengers (ICAO, 2025, p. 6). These rates have been consistent in the past five years. From 2019 to 2024, the accident rates are as follows: 2.94, 2.14, 1.93, 2.05, 1.87, and 2.56 accidents per million flights (ICAO, 2025, p. 8). These figures demonstrate that even across millions of flights each year, accidents are extremely rare, and fatal ones even more so. This reinforces the claim that airlines operate with a high standard of safety.

In comparison to other modes of transportation, the chance of harm in an airplane is significantly lower than with other modes of transportation. To compare the safety of different modes of transportation, the fatality rates must be converted into passenger deaths per 100 million miles. In 2022, passenger vehicles scored 0.62 passenger deaths per 100 million miles, buses scored 0.004, passenger railroads scored 0.03, and aircraft scored 0.001 (National Safety Council, n.d.). This means that a person is 620 times more likely to die in a car accident than a plane accident, which directly contradicts the belief that flying is unusually dangerous.

This low accident rate can be attributed to many factors, such as pilot training. For a pilot to be qualified to fly an airliner, they must have an Airline Transport Pilot certificate (ATP). The general requirements for this are that the pilot be at least 23 years old, be able to read, write, speak, and understand English, be of good moral character, hold a commercial pilot certificate with an instrument rating, and pass both a knowledge and practical test (Federal Aviation Administration [FAA], 2025, §61.153). In addition to this, a pilot must have at least 1,500 hours of flight time. This must include 500 hours of cross-country flight time, 100 hours night flight, 75 hours instrument time, 50 hours in a specific class of airplane, and 250 hours as pilot in command (FAA, 2025, §61.159). *Cross-country* time is accumulated on flights of more than 50 nautical miles, *instrument* time is accumulated when the plane is navigated solely by flight instruments, and *pilot-in-command* time accumulated is while a person is responsible for the operation and safety of the aircraft. This training typically takes between 3 and 7 years and ensures that each pilot is proficient in handling emergencies and maintaining a high level of safety.

In addition to the high level of pilot training, the aircraft are engineered to be as safe as possible. One of the key safety features is the redundancy built into each aircraft. In the context of aviation, *redundancy* often refers to the duplication of different critical systems or components in order to increase reliability (Melbourne Flight Training, 2025). The backup systems ensure that if a part malfunctions or fails, there is always another to take its place to avoid compromising safety (Melbourne Flight Training, 2025). Some of the more common redundant systems found in different planes are hydraulics, electrical, flight controls, avionics (navigation and communication), fuel, and pitot-static systems (provides information to flight instruments such as the airspeed indicator, altimeter, and vertical speed indicator) (Melbourne Flight Training, 2025). As a result, the failure of a single component rarely leads to catastrophic outcomes, reducing the likelihood of an accident. These systems significantly reduce the likelihood of total system failure and are a major contributor to aviation safety.

Many of the concerns over flying come from the seemingly constant plane crashes on the news and social media; however, this concern is unfounded. Media coverage often emphasizes rare aviation accidents because they attract more attention from the public. This can distort the perception of risk, despite data pointing to a consistently low rate of accidents. Simply because something gets more media coverage does not mean that it happens more often. Recently, the media has promoted the narrative that aviation has become more dangerous; however, it is at its safest point to date. Although media is a common way to watch the state of aviation, statistics from reputable sources such as the ICAO or the NTSB should always be checked. As a result, the visibility of accidents rather than actual frequency shapes public fear of flying.

There is also a common belief that aircraft accidents are especially deadly, but this is not true. In reality, the chances of being fatally injured in an aircraft accident are significantly low. Between 2001 and 2017, 1.3% of passengers involved in an aircraft accident were fatally injured, and 0.6% of passengers were seriously injured (NTSB, 2020). This leaves 98.2% of passengers involved in an aircraft accident surviving with minor injuries or no injury at all. Between 1983 and 2000, 4.2% of passengers were fatally injured, 1.1% were seriously injured, and 94.7% were left with minor or no injuries (NTSB, 2020). This data shows both a low chance of fatal injury and an upward trend in safety in the past 40 years. These low fatality and injury rates are accentuated by the low rate of accidents to create an incredibly low chance of dying or receiving a serious injury in an aircraft accident. This demonstrates that even in the rare case of an accident, the vast majority of passengers survive, further reinforcing the overall safety of air travel.

In conclusion, despite the fear often associated with air travel, data consistently shows aviation to be one of the safest modes of transportation. With relatively low accident and fatal injury rates, strict oversight under Part 121, rigorous pilot training requirements, and advanced aircraft engineering with redundant systems, airlines prioritize safety at every level. Although media coverage may amplify the perception of danger in flight, statistical evidence proves that flying is far less risky than driving. As safety measures continue to improve over time, air travel remains a reliable and safe way to travel.

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On the Far Side of Religion: How Culture and Personal Experience Shape Modern Understandings of Death

Research Paper by
HENDRY RAMANAMIRIJA SOAHARINOSY

ENGL 1302: COMPOSITION AND RHETORIC II

In his paper, Hendry explores multicultural perceptions of death. He incorporates primary research from English- and French-speaking communities along with secondary research from academic sources. What we have here is a prime example of undergraduate research that explores a somewhat rigid topic without restricting exploration to preconceived notions.

- Joanne King Gonzalez

Death is one of the few experiences shared by all human beings; however, people understand and respond to it differently. Throughout history, religion has played a central role in shaping beliefs about death and the afterlife. Religious traditions often provide explanations about what happens after death and offer comfort to those dealing with death. Philosophers have tried to explain why humans fear death. Vladimir Nabokov once described human existence as “a brief crack of light between two eternities of darkness” (as cited in Dresser, 2025). He captures the uncomfortable but powerful idea that life is temporary and fragile. Life’s ephemeral nature often prompts people to comprehend death by searching for meaning in religion, culture, or personal experience.

Attitudes toward death influence how people cope with grief, make ethical decisions, and discern the meaning of life. Beliefs about death affect perceptions of death as well as practices around death such as mourning rituals, funeral traditions, and decisions about what happens upon dying. Understanding how people interpret death also helps researchers understand wider cultural trends. In societies where religious affiliation is becoming more diverse and sometimes less central to identity, learning about how people interpret death can reveal how cultural and personal influences interact with traditional religious beliefs. Although religion historically shaped beliefs about death, in modern society, individuals interpret death more through personal reflection, cultural influences, and individual understanding than through religious identity alone.

Historical Role of Religion in Understanding Death

Historical examples show that religion once had a key role in shaping beliefs about death. Ancient Egyptian society connected burial practices to religious ideas about the afterlife. Ikram (2003) explained that the ancient society practiced mummification and elaborate tomb construction to prepare the deceased for continued existence after death (Chapter 2–3). These practices show a combination of perspectives in which religion determined how people understood and experienced death. In contrast, people in modern societies are more likely to develop a personal interpretation of death. This shows that even if religion once controlled how people understood death, it is now just one of many influences that shape modern attitudes.

Religion and Death Attitudes in Modern Research

Research supports the idea that religious identity does not always determine how individuals feel about death. Dezutter et al. (2009) researched the relationship between strong religious beliefs and beliefs about death and wrote, “research to date has failed to reveal consistent associations between religiosity and death attitudes” (p. 73). Therefore, one can conclude that religious belief alone does not always lessen the fear of death. Instead, this study found that “a literal, closed-minded, and dogmatic approach to religious contents is associated with more death anxiety” (Dezutter et al., 2009, p. 90). So, religion works less as a fixed system dictating beliefs about death, but more as a support system that people interpret and use in different ways. In other words, two people who share the same religious background may have profoundly different perspectives on death depending on their own experiences.

Another study by Miller and Beaman (2024) analyzed discussions in “Death Cafés,” informal gatherings where people openly talk about death. Their research shows several common perspectives about the afterlife, including beliefs that death represents a complete end, an unknown state, a transformation of energy, or a form of transition. The authors stated that participants “draw simultaneously on many ideas” and form perspectives of death “without the guidance of religion,” showing a departure from traditional religious dogma (Miller & Beaman, 2024, p. 1). These multiple perspectives exist outside formal religious beliefs, showing the influence of personal interpretation. This study explained that individuals increasingly built their own understandings of death rather than relying solely on religious teachings. Miller and Beaman’s research supports the idea that modern attitudes toward death are shaped by individual reflection and cultural context.

Survey Methodology

To explore how individuals understand death and how religion influences their perspectives toward it, I conducted an electronic survey. The survey included short-response questions, asking participants to describe what death means to them, whether they believe in an afterlife, and how much their religion or cultural background shapes their views. A total of 105 responses were received. Most respondents were between the ages of eighteen and twenty-one, but additional responses were collected from older participants, some of whom completed the survey in French. In total, the survey gathered a diverse range of perspectives across different levels of religious belief, from strongly religious individuals to those who identify as non-religious, and non-religious but spiritual. This range allowed a general understanding of how attitudes toward death are formed, highlighting both the influence of religion and the role of personal interpretation.

Results

Religious Perspectives on Death

A significant number of participants (76%) expressed traditional religious views of death. Many described death as a transition rather than an end, often referencing ideas such as the continuation of the soul, resurrection, or eternal life. For example, one respondent, Berthine Rasoa, explained that "death is a bridge to eternal life," and another said that their faith allows them to view death "as a passage rather than a definitive end." These responses show that religion continues to provide meaning, structure, and emotional comfort. This pattern was especially visible among older participants, many of whom reported little to no fear of death because of their strong religious beliefs and confidence in an afterlife. At the same time, even from a religious perspective, personal interpretation remains important. One participant Myles Hunt identified as Christian and explained that although she believes in God, "[her] relationship with faith is not centered on what happens after death." Instead, she emphasized, "living a meaningful life, serving others, and respecting different beliefs." She also said that death may simply resemble the state of nonexistence before birth and expressed that she would be at peace with that possibility. This response shows how individuals can still have religious identities while forming independent and deep understandings of death.

Personal Interpretation Within Religion

Even among religious respondents, individual beliefs were not always strictly aligned with formal religious beliefs. Many individuals combined their understanding of religious dogma with personal reflections, uncertainty, or other influences. For example, one participant said that even though they grew up Christian, their views on death were shaped more by personal reflection and media rather than by religion itself: "I'm not really scared of dying. I don't think [it] is because of the religion I grew up in, it was mainly about me arguing with myself about whether it is scary or not, and also… the media [influence]." Another participant explained that religion once influenced their fear of death, but over time they developed their own understanding independent of it: "… I just assumed that I'm not scared of dying not because of what my surroundings thought about it, but because I 'left' that 'surrounding'… So, does religion influence my thoughts about death, no[t anymore]." These responses show that people do not simply follow religious beliefs as they are but interpret beliefs based on their personal experiences.

Non-Religious Perspectives

Additionally, 12% of participants rejected traditional religious explanations entirely while still holding meaningful interpretations of death. Some described death as the absolute end of existence, while others believed in more abstract ideas such as energy, nature, or symbolic continuity through memories. For example, one respondent, Marianne, described death as "just like going to sleep and never waking up," highlighting that there is no afterlife or spiritual continuation. Despite this, Marianne still found comfort in the idea that loved ones may be remembered through signs in nature, such as birds or sunsets. Respondents also expressed doubt toward religion, viewing it as a "human-made system" that can sometimes feel controlling, especially when religion links behavior to the promise of a better afterlife. This shows that even without religious contexts, individuals continue to search for meaning and emotional reassurance when thinking about death.

Discussion

Overall, the survey helped support the argument that while religion remains an important factor in shaping attitudes toward death, it is neither the only nor the dominant influence. Instead, participants develop their own understanding by combining religious ideas with firsthand knowledge, cultural context, and self-reflection.

To conclude, understanding how people think about death is important in fields like psychology, sociology, and cultural studies. As society becomes more diverse and connected, people are exposed to different beliefs about death. Realizing that both religion and subjective experience shape views about death can help create more open and respectful conversations about grief, spirituality, and dying. Today, attitudes toward death show a mix of religion, culture, and personal thinking. Even though religion still plays a key role, people sometimes interpret those beliefs in their own way. Both survey results and research show that people with the same religion can hold vastly different views about death. Recognizing this diversity helps explain why conversations about death are increasingly personal and reflective today. Rather than accepting a single explanation, many individuals build their own understanding of death by combining religious beliefs, cultural traditions, and individual experiences.

So, reflecting on death eventually becomes a way of understanding life itself. If human existence truly is "a brief crack of light between two eternities of darkness" (Nabokov, 1936, as cited in Dresser, 2025), then the meaning people search for in religion, culture, and personal understanding may be less about escaping death and more about learning how to live within that brief moment of light.

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Behind the Pattern, Beneath the Ribbon: Stories of Suppressed Womanhood

Research Paper by
MADELINE SHIFFLETT

ENGL 1302: COMPOSITION AND RHETORIC II

This research assignment asked students to place two literary short stories in conversation with one another in order to explore a shared theme connected to a contemporary societal issue. In Madeline's essay, the student analyzes "The Yellow Wallpaper" by Charlotte Perkins Gilman and "The Husband Stitch" by Carmen Maria Machado to examine how patriarchal control is often disguised as beauty, care, and intimacy. She argues that both stories reveal how women's oppression persists not only through overt domination but through subtle aesthetic and domestic forms of coercion. By weaving together close textual analysis with historical and feminist scholarship, she demonstrates that these narratives—though written more than a century apart—expose the same underlying societal issue: the silencing and containment of women's lived experience.Ultimately, her writing proves that literature remains a powerful lens for understanding how systemic gender inequality continues to shape private spaces, intimate relationships, and cultural expectations today.

- Jessica Locke

There exists a kind of violence that does not shatter glass or bruise the skin. Beginning, as such things often do, with softness. It settles into embroidered linens and lamplight, into perfume and quiet laughter, into the reassuring language of care. There is no clamor, no visible threat—only the gentle implication that love knows best, that property protects, that obedience is beauty. It teaches women to trust what is beautiful, to bend toward what feels safe, to surrender to love; and it is within that surrender that the sharpest harm quietly blooms. Patriarchy has always exercised its power most effectively when it conceals itself within beauty. Whether in the pale, fevered spiral of wallpaper or the small, skillful bow resting at a woman's throat, cruelty becomes almost indistinguishable when it is made lovely. Charlotte Perkins Gilman's *The Yellow Wallpaper* and Carmen Maria Machado's *The Husband Stitch* unfold like whispered confessions passed through generations of women, revealing how patriarchal power embeds control within the aesthetic and intimate surfaces of women's daily lives, transforming seemingly harmless objects into instruments of coercion. They draw the reader inward, into rooms where beauty turns suffocating and affection grows teeth.

The two stories do not merely parallel one another; they reveal that the aestheticization of gendered violence transcends historical periods, adapting itself to new cultural forms while maintaining its essential structure. Through destabilized domestic spaces, symbolic objects that simultaneously allure and suffocate, and narrative strategies that reclaim the very voices patriarchy attempts to silence, Gilman and Machado demonstrate that women's oppression persists not only through overt domination but through the seductions of beauty and the illusions of care. Their works remind us that what appears gentle may be lethal, and what appears loving may, in truth, be designed to contain. This reorientation—beginning with the complicity of beauty rather than the fact of silencing—allows us to understand patriarchy not as a system of pure force, but as a system that camouflages force through aesthetics. From this vantage point, the first necessary movement is toward the spaces themselves: the rooms, beds, and intimate settings that are designed to look safe while functioning as sites of surveillance and discipline.

Gilman constructs the domestic sphere not as a refuge but as a carefully engineered mechanism of obedience. The narrator is placed in a nursery chosen for her recovery, meant to be soothing; instead, the room watches her. The barred windows offer light without freedom, the bolted bed denies movement, the wallpaper trembles in the dimness, its color sickly, indecisive, somewhere between sick bloom and rotting fruit. John frames the space as restorative, insisting that isolation and silence will return his wife to health. Yet the narrator experiences this space as a site of psychic erosion, noting that its oppressive stillness amplifies her despair; even as she tries to express her worsening condition, John infantilizes her, calling her *"little girl"* and insisting, *"I am a doctor, dear, and I know" (Gilman)*. On the surface, the statement appears to offer reassurance; beneath it lies the epistemic certainty that male knowledge supersedes female experience. In <u>The Madwoman in the Attic: The Woman Writer and the Nineteenth-Century Literary Imagination</u>, Sandra Gilbert and Susan Gubar succinctly describe this structure, noting that nineteenth-century women were often "contained within male-defined structures of reason," permitted only interpretations men deemed reasonable (20). Gilman dramatizes this dynamic through John's relentless insistence that his wife's observations—her sense of oppression, her physical symptoms, even her intuition—are products of nervous weakness rather than insight. As a result, she becomes alienated not only from her physical environment but from her own ability to interpret it. Conversely, Machado's narrator inhabits a world that gleams with modern polish, yet its refinement masks an equally precise choreography of control. She is not locked away, but she is sculpted—trained into the art of pleasing with grace—trapped within a system that continually overwrites her perception of her own body with her husband's entitlement. She becomes the wife who anticipates desire before it is spoken, who tempers her discomfort into charm, who performs devotion as aesthetic perfection. When she warns him not to touch her green ribbon—"You can touch me anywhere… but not my ribbon"—the boundary is clear, concise, and self-possessed. Yet he treats her restriction not as an expression of autonomy, but as an obstacle to overcome (Machado). His fixation reflects what Sarah Rodriguez identifies as a practice in which postpartum sutures were tightened "for the husband's benefit" while women's pain was minimized or ignored (Rodriguez). Machado's story thus reveals that the dismissal of women's bodily knowledge is not merely interpersonal but historically structured. Judith Butler's concept of gender performativity offers a framework for understanding why these men expect their wives to remain compliant. Butler argues that gender norms become powerful through "the stylized repetition of acts," creating the illusion that certain behaviors—docility, sexual availability, self-erasure—are inherent to womanhood (Butler 191). In both stories, the female protagonists are disciplined into performing scripts that prioritize male comfort. Their resistance, however small, threatens the coherence of these gender norms and is therefore rewritten as irrationality or defiance. By establishing how patriarchal authority silences female experience, each narrative prepares the reader for a more profound realization: that patriarchy's most potent instruments of control are embedded not only in interpersonal relationships, but in the symbolic and aesthetic objects that populate women's worlds.

The objects around these women do not remain inert. They awaken. Gilman's wallpaper initially appears as an irritating backdrop—"a smouldering unclean yellow" with a "lame uncertain curve"—but it evolves into a symbol of oppressive domestic order, its lines twisting with unnatural devotion. The narrator's eyes return to it compulsively, as though it murmurs her name through its grotesque arabesque. Slowly, a figure emerges behind the pattern—a woman "stooping and creeping" behind the bars of the design, trapped in endless repetition (Gilman). The vision unsettles not for its strangeness but for its familiarity. In that crawling figure lives a mirror. Susan Lanser argues that the wallpaper's grotesque imagery disrupts Victorian ideals of feminine purity, revealing "a horror embedded within the domestic ideal" (Lanser 425). The wallpaper becomes a visual embodiment of patriarchal containment, simultaneously decorative and suffocating. Machado's ribbon offers a softer terror. It lies like a vow against her skin, the single element of her body that remains hers alone. Yet its delicate beauty becomes a pretext for male violation. The husband interprets her secrecy as seduction rather than self-preservation, and his fascination gradually morphs into entitlement. When he finally unties the ribbon—despite her explicit refusal, the act becomes a violent assertion of ownership. Machado writes, "He does not apologize. I do not forgive him," collapsing centuries of marital entitlement into a single devastating gesture (Machado). The ribbon thus symbolizes the cultural expectation that women's bodies exist for male consumption, ornamented for pleasure and stripped of autonomy. These symbolic objects prepare the ground for a more chilling realization: Gilman's wallpaper was not merely psychologically oppressive. Given the history of arsenic-based pigments in Victorian décor, it may have been literally toxic.

To read the rest of this article, please visit
https://lscmontgomerycac.com/2026/madeline-shifflett/

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A Dissection of Grooming and Hyper-normalization Dynamics in "Bloodchild"

Essay by ABIELA SWAN

ENGL 1302: FRESHMAN COMPOSITION AND RHETORIC II

The students were required to create and review an AI analysis of a short story. As a part of the analysis, the students were expected to identify assertions in the AI paper that required additional support; that support was limited to the story itself and the college's databases. Since the focus of the assignment was on analysis, the prompt did not call for a single, unified paper; instead, the students were expected to address four distinct aspects of the AI paper: an introduction (the prewriting process), secondary research, development, and a conclusion (a short commentary on the threats and opportunities ion the AI tool).

- David Zimmerman

Introduction

I wrote an analysis of a Gemini-generated paper identifying the elements of Octavia Butler's 1995 short story "Bloodchild" describing Gan's experiences with grooming and hyper-normalization illustrated in the narrative.

My exploration of Octavia Butler sparked an initial idea, but the prewriting assignment helped refine my research topic. Further exploration of her work clarified a focus that sparked my interest. The prompt I developed in the end is "Write a 4-page MLA-style paper comparing grooming techniques and hyper-normalization to how Gan from Octavia Butler's "Bloodchild" exercises them within the narrative. Present it in a literary way."

Within the research topic, it is imperative to identify what constitutes grooming and refine the term within the context of the content. The short story presents the idea conceptualizing the evolution of it, setting up a pattern of intensification for each construct. Based on that notion it is essential to create a distinction between what causes the term to become an intensified version. Hyper-normalization is the enhanced word for normalization, that allows the readers to convey the outlandish situations society tries to brush off as relative and isolated rather than the large-scale ordeal it revolves around. Further developing the thesis requires a demonstration of the relationship between the terms as defined by Gemini and Butler's "Bloodchild."

Research

The two sources I chose, "A Self-Regulation Model of Sexual Grooming" by Ian A. Elliott and "A Dream of Perpetual Rule" by Gloria Davies these articles provide valuable tools for comparison and visualization, enabling me to define my terms with greater precision.

Originating from the JSTOR database, these articles delve into the intricate dynamics of grooming and hyper-normalization, offering perspectives that create fluidity across various scenarios.

The article "A Self-Regulation Model of Sexual Grooming" accurately conveys the process, targeting, and even the act the predator forces onto the child. The term, grooming, shifts from expert to expert, so for the narrative I chose to use "A process by which a person prepares a child, significant adults, and environment for abuse" with the result focused on "gaining access to the child, gaining child's compliance, and maintains child's management secrecy" (Elliott 1). Based on that definition, providing evidence to support my argument strengthening the term. From the article, I used it to demonstrate the predatory behavior T'Gatoi exhibits by engaging in "the same types of behavior to develop relationships with caregivers," the reason behind the technique centering around gaining "access to children" with T'Gatoi using tactics to target Gan for implantation (Elliott 1).

Hyper-normalization is a nuanced topic that can be applied to various situations. In Gloria Davies's "A Dream of Perpetual Rule," she uses the term to identify the behavior exhibited by Joseph Stalin after WWII. I recognized how "clinging to established discursive norms" normalized Stalin's administrative approach on a massive scale, falling into Stalin's Communist way of pushing normalization to intensify into hyper-normalization (Davies 7). Based on the political war example, it is easier to shape the same function into Butler's "Bloodchild" and compare the tactics to Gan, T'Gatoi, and the preservation system.

Development

Analyzing the story, A.I. tries to push the narrative of a "Tlic family subtly preparing Gan for his role" ("Write a 4"). It completely denounces the horrifying demonstrable truth that his Terran family allows him to be groomed and then hyper-normalizes the implantation. Gan tells the readers, while preparing for T'Gatoi to deposit her eggs into him. The protagonist's inner dialogue states, "I knew what to do, what to expect. I had been told all my life" (Butler)—the A.I. misses the blatant evidence within the short story, instead creating some discount version of "Bloodchild" where a Tlic family "adopts" a "human" ("Write a 4"). In Butler's description, the reader encounters two distinct species that drive the story forward: the Tlic and the familiar Terrans. From the description, Butler depicts a world devoid of humanity where the silence of abuse reigns supreme.

A.I. tries to paint a symbiotic relationship without understanding that grooming is about maintaining control. The seemingly sweet intentions of the predator are plots to target a child for their own gain. In "Bloodchild," T'Gatoi offers eggs to the family stating, "enjoy not being sober" revealing the eggs to keep the family drunk (Butler). Later, Lien, Gan's mother, is pressured into eating the rest of his egg by T'Gatoi's imploring that, "They are for the family. Please take it" (Butler). A common tactic with abusers is that they garner not only the child's trust, but also edge the family out of the picture in order to gain full access to the child. The tool completely missed what grooming, especially of a sexual connotation, develops as with the "symbiotic" comparison being horribly misused within the interpretation ("Write a 4").

Content

When analyzing Gemini's paper, a stark realization became clear. The tool, regardless of the story, will never read the material provided. Not only does it consistently spit out bullshit evidence, but the A.I. refuses to write about certain topics. I had to create three versions of my original prompt before it produced an essay. At every attempt, Gemini refused, emphasizing that it could not write sensitive content that would upset people. The A.I. silences voices and forces opinions onto individuals. I immediately recognized prime weaknesses with every quote being inaccurate, and the A.I. confusing Lien as Gan's brother and the N'Tlic forced to birth the larvae, combining these characters into a single amalgamation. Within the paper, the A.I. refers to the larvae as "parasitic" ("Write a 4"). However, despite that, the tool consistently tries to explain the tumultuous relationship between Gan and T'Gatoi as "symbiotic" ("Write a 4"). Gemini does not understand the term symbiotic as inappropriate to use in a paper, even though it tackles themes of predatory targeting, grooming, and hyper-normalization on a demonstrably horrid proportion. Once again, missing these key components is necessary to communicate the intended meaning.

After recognizing the weaknesses, I sifted through the paper for any notable opportunities. A.I. allowing individuals to check when their potential essay is too broad or has too many topics for one paper, acting as a tester for people. Despite the incorrect quotes, the times the paper remained on topic; it offered insightful explanations for how hyper-normalization and conditioning formulates the narrative. The implantation forced a swell of confusing emotion onto Gan, affecting his ability to understand the action needed to take control of his life again. Gemini identifies and then explains T'Gatoi's manipulation, where she reframes the implantation as "an act of preservation rather than exploitation," showing the tool does understand the complexities of hyper-normalization ("Write a 4"). The tool's conclusion is unduly strong given the A.I's constant misrepresentation of Butler's "Bloodchild." However, the analysis promotes research into situations similar to Gan and T'Gatoi, specifically parasitic-symbiotic relations, and how it relates to grooming.

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The Native American Graves Protection and Repatriation Act: Legislative and Regulatory Responses in California, Colorado, and Texas

Research Paper by SOPHIA DAVIS

GOVTH 2306: HONORS TEXAS GOVERNMENT

Sophia Davis's original and detailed research paper exemplifies the value of independent student investigation. For their Honors Texas Government project, students were charged with exploring a topic of their choosing, conducting a thorough review of the standing literature, sourcing and conducting an expert interview, and completing the research process with a polished 20+ page paper. Prioritizing authenticity over ease of inquiry, Davis selected a challenging interdisciplinary topic suffering from scare academic attention and little public awareness. Her primary interview with a leading policy implementor demonstrates the benefit of undergraduate students reaching beyond the secondary literature in their pursuit of knowledge. Deconstructing the complexities of intergovernmentalism, cultural (in)sensitivities, and the power and limitations of political definitions, Davis's paper offers a stellar example of student-led, end-to-end undergraduate scholarship.

- Fiona Ross

Abstract

This research offers a comparative study of state-led responses to the federal Native American Graves Protection and Repatriation Act of 1990 and the 2024 regulatory revisions, analyzing Texas in relation to Colorado and California. Although an impactful Act, NAGPRA has left Indigenous tribes turning to supplementary state initiatives to protect their graves and repatriate sacred items. Evidence indicates that closing NAGPRA's loopholes and omissions through state-level initiatives can advance the repatriation process and contribute to long-awaited justice for Indigenous communities. In this respect, California has done the most to enhance the fragmented federal approach and Texas the least. The research investigates Texas' reticence to further the protection and repatriation of sacred objects despite the possibilities exemplified by Colorado and California and unpacks intersecting barriers to effective action. The results indicate that a cultural elevation of private property rights, political competition over scarce resources, limited tribal recognition and legal definitions as well as institutional complexities help explain inaction in the Lone Star state.

Introduction

Life, death, and the transition in-between carries great significance in Indigenous cultures. From ceremonies to sacred songs, Indigenous peoples have established practices to ensure a restful state for the deceased. Specifically, the dead, along with their belongings, should remain undisturbed. Across time, however, foreign monarchs, Western religious institutions, and a complicated national character have contributed to the erasure of Indigenous identity, customs, and items worldwide (Falcon 9). In addition, the removal and scientific study of Indigenous remains and culturally sacred objects without tribal consent has proved to be a thorny, long-standing point of contention. For Indigenous communities, ancestral remains and items "discovered" by outside parties are not simply "artifacts" to be scientifically analyzed but rather significant and sacred elements of their cultural history.

Grave-robbing for private collections and scientific research became prevalent during the 18th and 19th centuries. Yet, it was not until the late 20th century that the United States Congress sought to rectify these offences with passage of the Native American Graves Protection and Repatriation Act of 1990, a landmark initiative that set the foundation for future regulatory and legislative protections. While unquestionably important, the NAGPRA was written by legislators with little to no knowledge of Indigenous laws or customs (Harms 605). Consequently, it contained significant omissions and left considerable room for misconception and confusion over Indigenous affairs. While the legislation was strengthened through federal regulations from the Department of the Interior in 2024 to clarify and improve how federal entities (museums, agencies, and universities in receipt of federal support) must conduct consultation, identification, repatriation, and consent processes as well as treat unaffiliated remains, NAGPRA still only applies to federal entities/institutions in receipt of federal funds and federal and tribal lands.

Notable deficiencies in the NAGPRA include ill-defined terms, applicability restrictions to federally recognized tribes, exclusion of "artifacts" found on private-land, lack of funding for implementation, verification, and evaluation, and finally a lack of respect for Indigenous customs and laws. Unsurprisingly, therefore, states have responded to the legislation in significantly different ways. Colorado has invested in building direct relations with its tribes through respectful interactions and systematic protections (Harms 631). California has gone further in enacting a state version of the NAGPRA; a near-replica of the national version, but one that plugs several key deficiencies (Turner 5). These efforts have enhanced the Indigenous repatriation process while improving wider relationships between the state and Indigenous peoples.

This research reviews the problematic background that necessitated the NAGPRA, analyzes its omissions, and unpacks state-level responses. In so doing, it highlights the challenges stemming from lackluster federal efforts, inconsistencies in implementation, and complexities in inter-governmental legislative and regulatory approaches.

Methodology

This research opens with an extensive scholarly literature review of the background, development, and compromises embedded within the NAGPRA, as well as the proactive measures that Colorado and California have implemented to alleviate impediments to repatriation processes. Following this discussion, the study addresses the systematic insufficiencies in Texas' response. To add further depth of understanding, the paper incorporates primary evidence from a semi-structured expert interview with Jessica Ulmer, Head of Compliance for NAGPRA at The University of Texas at Austin's Archeological Research Laboratory (TARL), conducted on November 4th, 2025. The research utilizes an in-depth case study approach to explain the struggle to repatriate sacred Indigenous objects in the Lone Star state.

Critical Literature Review

History

During the late 18th century to early 19th century, grave-looting of Indigenous remains dramatically increased throughout the United States. Indigenous graves were desecrated for scientific research and personal collections without consultation with Indigenous communities (Trope and Echo-Hawk 42). President Thomas Jefferson personally looted graves on his Virginia property, thereby legitimating and promoting desecration under the guise of scientific inquiry (Wiley 7).

It was not until the late 19th century that Indigenous tribes were legally determined to be sovereign nations. However, their independence remained restricted. At the peak of the grave-looting era, Indigenous peoples lacked the legal rights to counter the looting of ancestral graves and sacred objects and federal action during the assimilation era, such as the Code of Indian Offences of 1883, which prohibited Indigenous people from practicing their religion, compounded the problem.

While resistance among Indigenous peoples had been episodic and typically localized throughout United States history, limited gains were achieved in the form of the Indian Citizenship Act (1924) and the National Congress of American Indians (1944). By the 1960s, however, the American Indian Movement (AIM) marked the beginning of an integrated political organization. The AIM later proved to be particularly important in driving the passage of the American Indian Religious Freedom Act (AIRFA) in 1978, which protected Indigenous peoples right to practice their religious customs and beliefs (Falcon 17). The passage of the AIRFA also proved critical for repatriation as it returned attention to the issue of grave-looting and paved the way for the NAGPRA in 1990. This federal attempt to address grave-looting on Indigenous grounds and mandate the return of remains and sacred objects was supposed to be a national response to a centuries old problem. However, the NAGPRA's gaps still proved to be substantial.

Unclear Terms

A foundational challenge limiting the efficacy of the NAGPRA is the definition of specific terms. For example, funerary objects are divided into two subcategories in the NAGPRA: unassociated and associated items. As defined by the Association on American Indian Affairs, "Associated funerary objects' includes objects placed with or near individual human remains as part of a death rite or ceremony where the human remains and objects are now in the possession of control of a Federal agency or museum, or 'exclusively' made for burial purposes or to contain human remains" (NAGPRA Compliance). Unassociated items are those in which the remains are not in federal possession alongside the corresponding item. This distinction creates confusion and conflict between tribes and the holding institution because the difference between the definitions is whether an object is or is not accompanied by remains in the institution's inventory. Additionally, federal institutions and museums are only required to repatriate associated funerary items, not unassociated items.

Much the same applies to the definition of "sacred" items. Again, defined by the Association on American Indian Affairs, "'Sacred objects' are those ceremonial objects which are needed by traditional Native American religious leaders for the present-day practice of traditional Native American religions. This includes both the use of the objects in ceremonies currently conducted by traditional practitioners and instances where the objects are needed to renew ceremonies that are a part of a traditional religion" (NAGPRA Compliance). This overly narrow definition excludes older sacred items that are no longer used in contemporary ceremonies. The definition itself, therefore, hinders repatriation and permits holding institutions to refuse returns on the basis that the requested remains or items have no present-day role in Indigenous ceremonies.

Private Land Protections

The NAGPRA's reach has similarly been limited by its distinction between public and private land protections. The legislation stipulates that only remains and items found on federal lands and tribal lands are protected (Trope 13). Tribal lands are defined as, "all lands within the exterior boundaries of a reservation, whether or not the land is owned by the tribe, Indian individuals or non-Indians, all dependent Indian communities, and any lands administered for Native Hawaiians…" whereas Federal lands are defined to include, "non-tribal land controlled or owned by the United States…" (Trope 13). Private and non-federally owned lands are explicitly excluded. This leaves much to state discretion as well as the individual. States and institutions are able to exclude provisions (unless federal funding, tribal treaties, or state law is involved) and private landowners have argued that the NAGPRA promotes the unconstitutional act of infringing upon and taking private property (Schmidt 51).

Limitation to Federal Tribes

A further stipulation of the NAGPRA is that it only allows repatriation requests from federally recognized tribes (Colton and Cordova 29). The request for federal recognition as an Indigenous tribe is a lengthy and costly process and numerous tribes are excluded (Owens-Barber 24). Not only must unrecognized tribes declare a cultural affiliation, but they must contend with and navigate competition from federally recognized tribes. Federally recognized tribes have actively opposed non-recognized tribes to reduce competition over already limited federal benefits (Weiss and Springer).

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https://lscmontgomerycac.com/2026/sophia-davis/

Journey Through History Journal

Essay by STACEY FLORES

HIST 1301: UNITED STATES HISTORY I

For this assignment, students utilize knowledge gained throughout the course to bring history to life. In her journal entries, Stacey highlights important moments and weaves historical detail into fictional narratives that are unique to each character. The chosen moments of each individual's life, based on a historical past, help her readers to go beyond what these individuals might have seen to show us what they might have also felt. In doing so, the past, and the people who lived it, become more real.

- Dawn Shedd

An Aztec Warrior, Tenochtitlan, 1521

The air in Tenochtitlan is thick with the scent of smoke and the copper tang of blood, a far cry from the lake breezes I remember from my youth. From the heights of the Great Temple, I watch the pale strangers and their Tlaxcalan allies tighten their grip on our beautiful city. Our supplies are dwindling, and the strange sickness that wilts the skin has taken more of my brothers than the obsidian blades of our enemies. I find myself wondering if the gods have truly turned their faces from us, or if we are simply witnessing the end of one sun and the painful birth of another.

Every night, the sounds of the Spanish cannons echo across the water like artificial thunder, shaking the very foundations of our homes. I spent today sharpening my macuahuitl, though my stomach growls with a hunger that no amount of courage can satisfy. We fight for every causeway and every canal, yet for every one of them we strike down, two more seem to appear in the distance. My wife tells me to have hope in the strength of our walls, but as I look at the ruins of the outer districts, I fear that the world we built is crumbling into the lake forever.

An Indentured Servant, Jamestown, 1610

I sit here in the damp cold of my hut, my hands so cracked and blistered from the clearing of brush that I can barely hold this charcoal. Life in Virginia is nothing like the golden promises whispered to me in the London taverns; instead of gold, we find only mud, mosquitoes, and the constant threat of starvation. The "Starving Time" has left us all looking like ghosts, with ribs pressing against our skin and eyes sunken deep into our skulls. I came here bound for seven years of labor in exchange for a hope of land, but now I only hope to survive until the next sunrise.

The woods around our palisade feel alive with eyes, and the tension with the Powhatan people grows more brittle with every passing day. We are desperate enough that men have begun to eat their own leather boots, and the governor's rules are as harsh as the winter frost. I often dream of the simple crust of bread I used to complain about back home, realizing now that I traded a life of humble poverty for a beautiful nightmare. If a ship does not arrive soon with supplies from the Crown, I fear this colony will become nothing more than a graveyard in the wilderness.

A Merchant's Daughter, Boston, 1773

The atmosphere in Boston is electric tonight, buzzing with a nervous energy that makes the hair on my arms stand up. Earlier today, I walked past the Old South Meeting House and heard the roar of the crowd demanding that the tea ships in the harbor be sent back to England. My father says that the King's taxes are a yoke we can no longer bear, and the sight of the British regulars in their bright red coats only fans the flames of our resentment. It feels as though we are standing on the edge of a great cliff, waiting for someone to give the final push.

As I write this by candlelight, I can hear muffled shouts coming from the direction of Griffin's Wharf and the heavy scent of salt air drifting through the window. There are rumors that men have disguised themselves to board the ships and dump the tea into the icy waters to prove we will not be bullied into submission. My mother worries that such defiance will bring the full might of the British Navy down upon our docks, but the spirit of liberty is a fire that does not easily go out. Whatever happens tonight, I suspect that our relationship with the Mother Country will never be the same again.

A Follower of the Prophet, Prophetstown, 1810

The air in our village on the Wabash is filled with the chanting of our brothers from many different nations. I came here from the south because I heard the words of the Prophet, who tells us to cast away the tools and the whiskey of the white settlers to return to our own traditions. Tecumseh is often away, traveling to speak with the Creeks and the Choctaws to build a great confederacy that can hold the line against the Americans. We are tired of seeing our lands sold away for beads and false promises by chiefs who have no right to give the earth itself.

There is a strange peace here, yet it is a peace that feels like the quiet before a summer storm. The American Governor Harrison watches us from Vincennes with a wary eye, and we know he views our gathering as a threat to his expansion. Every day, more families arrive at the junction of the rivers, bringing stories of settlers crossing the boundaries and clearing the forests we have hunted for generations. I spent the afternoon repairing my bow and listening to the elders speak of a time when the Great Spirit ruled the land alone.

We do not seek a fight, but we are no longer willing to step backward into the setting sun.

A Free Woman of Color, New Orleans, 1840

The humidity of the morning already clings to my silk dress as I walk through the Place d'Armes toward the market. New Orleans is a city of a thousand sounds: the whistles of the steamboats docked at the levee, the cries of the street vendors, and the mix of French, Spanish, and English voices. As a woman of my status, I move through a world that is neither fully white nor enslaved, navigating the delicate social layers that define our lives here. I see the wealth brought in by the cotton bales piled high on the docks, but I also see the heartbreak of the slave pens where families are torn apart for profit.

Tonight, there is a ball that many of my acquaintances will attend, but my heart is heavy with the news of stricter laws being debated in the legislature. They wish to curb the freedoms of people like me, fearing our presence reminds them that the line between "free" and "bound" is thinner than they care to admit. I watched a young girl being sold yesterday, her eyes filled with a terror that haunts me even as I sit in the comfort of my own parlor.

This city is a jewel of the South, glittering and beautiful on the surface, but the soil beneath it is soaked in a sorrow that no amount of music or perfume can truly hide.

A Soldier's Ordeal: The Wounding of Quiren M. Groessl in World War I

History Research by
ALAN WILHELM

HIST 1302: UNITED STATES HISTORY II

Students in HIST 1302 were tasked with writing a section of a larger paper I was working on about a World War I soldier. In the partial presentation of our collaboration printed here, I completed the sections "Captured" and "A Bloody Roll Back." Student Alan Wilhelm wrote the paragraph between titled "Wounded." Our soldier left a diary but Alan had to use creativity to piece together what was happening. He handled this wonderful primary source with skill. Direct quotes interspersed in the telling of Groessl's account lend authenticity to Alan's interpretation. The "Wounded" section shows Alan would make a great screenplay writer in the Hollywood film industry.

- Craig Livingston

Captured

The Germans knew something was up. Groessl was awake the morning of 27 May. His glow-in-the-dark watch shows 04:42 and the "first grey streaks of dawn in the Easter sky are beginning to appear." Without warning, German artillery opened fire. "The air was filled with the piercing whine of approaching shells. . . Large clouds of dirt were thrown into the air by the exploding shells as the rolling barrage crept closer and closer to our trenches." Groessl looked over the top of the trench but instead of German assault troops following the barrage, he saw nothing. Then the pattern of artillery fire changed. The Germans began firing to the rear and sides of Groessl's position but nothing on the front. A three-sided "box barrage" isolated the target area, in this case Groessl's section of trench, to prevent the arrival of reinforcements.[1]

Groessl did not immediately know it, but the German unit opposite the 28th Regiment were conducting a limited trench raid to gain intelligence about the suspected attack on Cantigny.[2] By the time the barrage began, German raiders, about 100 of them, had infiltrated the American lines.

Groessl turned around and saw two Americans soldiers laying at the bottom of the trench. Pehaps thinking they had been hit by artillery fire, he rose up to scan no-man's land again when suddenly he was yanked down from behind and landed at the bottom of the trench:

1. Quiren M. Groessl, "Big Boy": A Diary of World War I," Quiren M. Groessl Collection, Library of Congress, https://www.loc.gov/ item/afc2001001.00296/, 27 May 1918, p. 54, hereinafter cited as Groessl diary.
2. For trench raids see John Ellis, *Eye Deep in Hell: Trench Warfare in World War I* (Baltimore: John Hopkins University press, 1977, 1989), 76-79.

> A German soldier grabbed my rifle from my hands while another standing beside him said, 'Las em gehn' [trans. "let's go"], and the German soldier on my back let go of me. . . [B]y pointing with their bayonetted rifles, I was ordered out of the trench toward the German lines.[3]

His German captors were anxious to re-cross no-man's land and get back to the relative safety of their own lines. "Mach schnell," one shouted, prodding him with a bayonet so closely that Groessl wrote, "I felt warm blood running down my back where the bayonet had cut."[4]

Wounded

As Groessl, now a prisoner, approached the enemy's lines, he saw German helmets in their trenches. A feeling, perhaps determination, perhaps desperation, came over him. "I didn't want to spend the rest of the war in a German prison camp," he later recalled, "This had to be it."[5] Hoping to reach his trench knife that his German captors had failed to notice, Groessl feigned a fall by stumbling into a shallow shell crater. Allied artillery, whistling through the grey dawn, came to his aid by startling his three captors. They dove to the ground on either side of him. Groessl, "angry at the German behind me who had nicked me with his bayonet," disregarded the danger of the shell fragments.[6] Rising faster than the others, he seized his knife and buried the blade into the throat of the soldier to his left, who dropped to the ground. Unable to wrench his knife free, he abandoned it, instead snatching the man's fallen rifle and, "swinging it like a club, caught the German on my right with the butt end of the rifle across the face or the neck and he too fell to the ground."[7] Groessl then whipped around to face the man behind him with the rifle, but he was too late. The German, already lunging forward with his bayonet, grazed his spine and slashed him "from shoulder to shoulder."[8] Groessl collapsed. The German soldier, likely enraged by his comrades' deaths, delivered Groessl a violent kick to the ribs to turn him over. The soldier stood over Groessl, intending to finish the job with his bloody bayonet. Groessl records that, perhaps hit by artillery shell fragments, or a stray round, the soldier then "gave a peculiar grunt, and fell over backward, dead at my side."[9]

A Bloody Body Roll Back

Groessl passed out. He regained consciousness the next day. Historian Richard

3. Groessl diary, 27 May 1918, p. 54.
4. Ibid., 55.
5. Ibid.
6. Ibid.
7. Ibid.
8. Ibid., 56.
9. Ibid.

Faulkner writes that virtually every disabled soldier left behind on the battlefield felt the "dread and powerlessness" of wondering if "his wounds would not be tended to before his life ebbed away."[10] Groessl lay in mortal danger. He was close to the German trench. If he called out he could be killed. He could also die from loss of blood. Renewed artillery fire or a casual burst of machine-gun fire from either side could also end his life. With "the sun shining down on me" his thoughts drifted to the shores of Lake Michigan, "back home with my mother, father, and brothers" where "the war was far away."[11] A cry brought Groessl back to the terrible fate awaiting him if he did not act. He could hear a wounded German soldier repeating, "O Mein Gott!" [Oh my God]. Maybe the German too had thoughts of home before a splash of artillery shells ended his supplications.[12]

Groessl mustered the will to live. In tremendous pain and experiencing shock, Groessl drifted in and out of consciousness. He prayed for strength to survive, to fulfill whatever purpose God had for him.[13] His arms were useless but Groessl devised a way to cross the 150 yards back to his own lines. By alternately pushing with his left and right leg, Groessl rolled himself over sideways from back to stomach and back over again like a rolling pin.Each revolution advanced him one yard closer. He likely had to get over a dead body or two and grind over sharp battlefield debris.

At some point in his excruciating journey, Groessl managed a sitting position. How he stood up, he cannot explain, but he sensed he was close to the finish line. Feeling "warm blood flowing down my neck and back," he made a final surge:

> Staggering drunkenly, my head hanging down and my arms hanging helplessly by my sides, I fell to the ground trying to cross the parapet in front of our trench. . . . The lookouts had alerted the others who lay down a covering fire. Two of our boys crawled partially out, . . . grabbed me by the blouse, and pulled me into the trench.[14]

Groessl's bloody tunic was cut from his body. Stretcher bears carried him to an aid station. At this point, Private Groessl entered the U.S. Army medical system. Doctors thought he would die.[15] Though his wounds were severe, Groessl lived.

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10. Richard Faulker in *Pershing's Crusaders: The American Soldier in World War I* (University of Kansas Press: Lawrence, 2017), 575.
11. Groessl diary, 27 May 1918, p. 56.
12. Ibid., 57.
13. Ibid.
14. Ibid., 58.
15. The seriousness of the wounds are listed in Ibid., 5 January 1919, p. 113.

The Future of Wearable Imaging in Sonography

Research Paper by AARON FUGAR

RADR 2305: PRINCIPLES OF RADIOGRAPHIC IMAGING II

Aaron's work demonstrates the type of professional and scientific writing commonly used in the field of diagnostic medical sonography and allied health sciences. The author effectively explains advanced concepts related to wearable ultrasound technology while integrating current research, technical terminology, and clinical applications in a well-structured format. Aaron showcases the ability to interpret emerging healthcare technologies, evaluate both benefits and limitations, and present information in a manner that is informative, concise, and academically appropriate. These communication and research skills are essential in medical imaging professions where understanding evolving technology and conveying accurate information contribute to quality patient care and informed clinical practice.

- Krystal Kidder

The first step in getting any diagnosis is diagnostic imaging. This is the very first glance that a doctor sees into the body and can begin to formulate ways to begin healing. The quicker that imaging can begin the better it will be for both the patient and the healthcare staff. Mobile and portable imaging is becoming hard to ignore because of its flexibility and ease of use to get diagnostic images to the radiologist and can be accessed from mobile devices. This paper will display what sonography is, what portable and wearable sonography is, the science behind it, the benefits, current limits and challenges, and how it will be used in the future.

What is Sonography

Sonography, also known as Diagnostic Medical Ultrasound, is a noninvasive imaging technique that uses high-frequency sound waves to produce real-time images of the body's internal structures (Kremkau, 2015). This technology operates by transmitting sound waves through a handheld device called a transducer, which sends the waves into the body and then detects their echoes as they bounce off tissues and organs (Rumack et al., 2018). The reflected sound waves are converted into visual images by a computer, allowing clinicians to observe structures such as muscles, blood vessels, and internal organs (Callen, 2016). Sonography is widely used in medical diagnostics because it provides detailed imaging without the use of ionizing radiation, making it safer than techniques like X-rays or CT scans (Society of Diagnostic Medical Sonography [SDMS], n.d.). It is commonly applied in Obstetrics to monitor the development of fetuses, and in Cardiology, abdominal imaging, and musculoskeletal exams. The quality of the images depends on the frequency of the sound waves and the skill of the sonographer operating the equipment (Kremkau, 2015). Advances in ultrasound technology, such as Doppler imaging and 3D ultrasound, have enhanced its diagnostic accuracy and expanded its clinical applications (Rumack et al., 2018). Overall, sonography plays a crucial role in modern medicine by providing clear, real-time visualization that aids in diagnosis, treatment planning, and patient care (SDMS, n.d.).

What is Wearable Sonography

Wearable sonography now uses ultrasound technology that is integrated into compact, bio-compatible patches or devices which adhere directly to the body and allow for continuous or long-term monitoring of internal tissues. These wearable ultrasound devices leverage the same basic principle as traditional sonography. A transducer emits high-frequency sound waves into the body, the waves reflect off internal structures, and the returning echoes are processed into images or measurements (Zhou et al., 2024; National Institutes of Health [NIH], 2022). Unlike conventional ultrasound systems that are large and operated in clinical settings, wearable systems are designed to be lightweight, flexible, and often wireless, enabling monitoring of organs, muscles, or blood vessels while the subject moves or rests over extended periods. The design of these devices require smaller transducer arrays, flexible electronics, and power-efficient systems to maintain imaging performance in a wearable form (Duan, et al., 2024). Wearable sonography represents an evolution of imaging from point-in-time, technician-operated scans to potentially autonomous, continuous monitoring embedded in daily life or remote settings (Wairimu, 2025). As research continues to advance, these systems now open new possibilities for real-time diagnostics outside hospitals.

The Science Behind Wearable Sonography

Ultrasound waves propagate through biological tissues by compressing the material as they travel, and when those waves encounter interfaces between different tissue densities, or for example muscle to fat, part of the wave is reflected while the rest continues onward (Duan et al., 2025). In wearable sonography systems, miniature transducers generate these high-frequency sound waves and then capture the returning echoes, converting them into electrical signals that are processed into images or quantitative data (Song et al., 2024). The pairing between the wearable device and the skin is critical: a flexible adhesive layer helps transmit ultrasound into the body while reducing signal loss and motion artifact (Duan et al., 2025). Beam-forming and signal-processing electronics embedded in the wearable patch optimize the spatial resolution and depth of penetration by adjusting the timing and direction of the emitted pulses (Song et al., 2024). Because the wearable form factor must operate under constraints of power, size, and continuous contact, engineers use low-power electronics, stretchable transducers, and wireless data transfer to maintain functionality over extended periods (Duan et al., 2025). One of the innovations in wearable sonography is the use of Doppler shifts and echo-time delays to assess movement of blood or tissues, enabling monitoring of events such as cardiac contraction or muscle motion (Song et al., 2024). Additionally, material advances such as flexible piezoelectric films and soft encapsulation allow the device to conform to curved skin surfaces, improve acoustic coupling, and maintain device comfort and reliability (Duan et al., 2025). Wearable sonography combines the fundamental physics of ultrasound wave reflection and echo detection with cutting-edge materials and electronics to enable continuous, non-invasive imaging or monitoring in a wearable form.

Benefits of Wearable Sonography

Wearable sonography systems offer several advantages that make them appealing for modern healthcare applications. One major benefit is their ability to provide continuous or long-term monitoring of internal structures in a mobile setting rather than in a traditional clinic, which could improve early detection and real-time tracking of physiological changes (NIH, 2022). The part of the patches that adheres to the skin enables monitoring of organs, muscles, or vascular activity while the subject goes about normal activities, potentially increasing patient comfort and compliance (NIH, 2022). Additionally, because these devices use ultrasound technology, they avoid ionizing radiation and reduce risks associated with exposure compared to modalities like CT or X-ray, which is especially important in long-term or frequent monitoring scenarios, for example patients with sensitive conditions such as cancer. Further, by embedding sensors and wireless data transmission, these systems can integrate with mobile or cloud platforms for prompt feedback.

Limitations and Challenges behind Wearable Sonography

Wearable Sonography also faces several important disadvantages and limitations that must be overcome. One key limitation is the reduced diagnostic effectiveness compared with conventional ultrasound systems wearable devices often need design compromises, for flexibility, low power, and comfort, which reduce acoustic performance, signal-to-noise ratio, and depth of penetration (Clinical, Safety, and Engineering Perspectives Review [CSEPR], 2023). Another challenge is maintaining consistent acoustic coupling between the device and the skin over long durations or during motion; if the sensor shifts or the skin integrity changes, due to sweat, movement, or curvature, image degradation can occur (NIH, 2022). Additionally, battery life, wireless data transfer, and device durability are practical issues for long-term wear and ambulatory use (CSEPR, 2023). The need for user training and potential device calibration also remains, as wearable ultrasound is still used less in practice than fixed clinical systems. Finally, clinical acceptance and approval of wearable ultrasound devices for many practices remain incomplete, which is slowing widespread adoption.

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A Nano Dose of Contrast: Tiny Particles, Big Impact

Research Paper by NEFTALI VILLEGAS-CONTRERAS

RADR 2305: PRINCIPLES OF RADIOGRAPHIC IMAGING II

Neftali's work reflects the analytical and research-based writing skills that are essential within the field of radiologic technology and healthcare sciences. The essay demonstrates the ability to critically evaluate scientific literature, synthesize complex medical research, compare emerging imaging technologies, and effectively communicate technical information in a clear, organized, and professional manner. Additionally, the work highlights strong critical thinking skills, evidence-based analysis, and scientific writing proficiency, all of which are vital in medical imaging professions where technological advancements directly influence patient care, safety, and diagnostic accuracy.

- Krystal Kidder

This essay will cover various pieces of research on the topic of how nanoparticles can replace traditional iodine-based contrast agents, particularly in CT and Fluoroscopy exams. While iodine contrast has played a valuable and reliable role in the world of radiographic imaging, the need for improvement in healthcare and medicine drives a curiosity of what could be the next best thing.

Literature Review

Metallic Nanoparticles for CT-guided Imaging of Tumors and their therapeutic Applications

This research explains the limitations of iodine contrast, gives reasons for needing improvement, and showcases the various experiments done to test various materials of nanoparticles which could be used for different imaging exams. Firstly, the need for a better contrast with better x-ray attenuation is necessary due to the many applications for its use. “High contrast imaging of the patient is critical for accurate and early diagnosis, and thereafter the elimination of the abnormality” (Gupta, 2023). Exams looking to diagnose blood clots, bone breaks, cancer, infections, and any cardiovascular diseases would benefit from a high attenuating contrast. Researchers have therefore looked at metallic nanoparticles as they show promising characteristics. The main attraction to metallic nanoparticles is their high Z numbers. The materials of interest in this research include gold, copper, iron, silver, platinum, holmium, tungsten, gadolinium, rhenium, lead, and molybdenum. According to data from this research, Gold has the highest atomic number at 79. It also has a k-absorption edge of 80.7 keV. On top of these qualities, gold nanoparticles can be engineered to be made biocompatible and can be made to have target specificity to organs or various tissues. The engineering of gold seems to be the biggest achievement of these experiments. For gold nanoparticles to be considered medically safe, various coatings were tested. The findings showed that coatings of 2-mercaptosuccinic acid (MSA) and Polyethylene glycol (PEG) enabled biocompatibility. This means gold could stay in the body for extended periods of time without causing adverse effects as iodine contrast can do in high quantities. On the topic of target specificity, gold nanoparticles coated with clostridium novyi-NT spores were able to be injected intratumorally and had successful germination in hypoxic tissue. Final CT imaging was able to show accumulation in target spots. This was also seen in M-capped GNPs when targeting lymph nodes. These nanoparticles are made with mannan which acts as a stabilizing and reducing agent. When they were injected into mice, high-contrast CTs saw high values in the popliteal lymph nodes seven times greater because of effective diffusion. The other metals tested have their own benefits. Copper-based nanoparticles engineered with selenium were tested and had some added benefits to the body as these substances are biodegradable and necessary for energy production and aid in making DNA. Along with these benefits, these nanoparticles displayed an 8-hour half-life whereas iodine contrast stays in the desired anatomy for only a couple minutes. The copper nanoparticles were also able to be cleared naturally over time by the kidneys. This is important because particles that stay in the body unnecessarily can cause adverse effects.

There are many promising findings in this research. While this is exciting, further testing is needed to make sure there is complete safety and understanding of this technology. A concern with this research is that not every nanoparticle is able to make it to clinical trials. Nanoparticles that haven't been tested therefore raise the concern of biological barriers and may cause toxicity. The body's macrophages may reject the nanoparticles which would defeat the purpose of administering them in the body. Clinical trials also require a larger quantity than is typically produced to be effective. But, continuing this research of nanoparticles may allow them to become a part of CT exams, particularly when imaging cancerous tumors.

Comparative Evaluation of Gold Nanoparticles as Contrast Agent in Multimodality Diagnostic Imaging

In this research, scientists address the adverse effects iodine-based contrast agents can have on the human body and showcase the improved qualities that nanoparticles have. It also states how different modalities can benefit from nanotechnology implementation. Iodine can cause allergic reactions. “In addition, the potential of iodinated contrast-induced nephrotoxicity in high-risk patients have also been reported.” (Nabilah, 2024). All patients should have the ability to receive diagnostic quality images without concern for serious adverse effects. Allergic reactions can be life threatening. In fluoroscopy, angiography studies require a large quantity of iodine contrast to best visualize structures. “Furthermore, the extremely large volumes of iodine contrast needed may cause discomfort to the patient during administration process.” (Nabilah, 2024). Patients who are at risk for iodine contrast studies include those with previous reactions to iodine contrast, those with asthma, people with renal disease, heart disease, hyperthyroidism, severe dehydration, and even pregnancy. “Excessive iodine exposure may cause thyroid dysfunction in some individual with higher risk for pregnant and breastfeeding patients, as it may cross placenta barrier and excreted into breast milk." (Nabilah, 2024). Studies have shown that metallic nanoparticles can solve this problem. "AuNPs have low toxicity effect and small size, are effortlessly transported by bloodstreams and are considered tolerable to be used in a high concentration of up to 1.4Au/kg." (Nabilah, 2024).

Another driving force for this research also includes the search for better x-ray attenuation. With iodine, there are limitations due to surrounding tissues that get in the way of their ability to highlight structures. Along with this is the inability of iodine to reach cellular levels. This is necessary to find cancerous tumor cells. The experiments done in this research compare iodine contrast to gold nanoparticles and their performance under four different imaging modalities. First, the two different contrast agents were prepared to have 5 different concentration levels of 3,5,10,15, and 20 millimoles. The experiments were then able to continue with CT imaging. The various concentration levels of contrast agents were able to be tested in a phantom model in the Siemens machine. Axial images were kept to have plenty of information about each sample in reference to the CT enhancement. Pictures were also taken at different energy levels of 80kVp, 100kVp, 120kVp, and 140kVp. Similarly, a Shimadzu was used as the fluoroscopy machine of choice. In this experiemnt, the various concentration levels of contrast were injected into a phantom and were irradiated under different fluoroscopy pulse modes at various energy levels of 50, 60, 65, 70, 75, 80, and 85kVp. What these tests were looking for was CNR. "CNR is a measurement method to study the capability of an imaging modality to differentiate radiographic structures." (Nabilah, 2024). Results showed that the 15nm of AuNP had the best CNR values compared to iodine contrast across the different imaging modalities.

Polymeric Nanoparticles for drug Delivery: Recent Developments and Future Prospects

This research touches on the versatility and the customizations that are possible with nanotechnology. "Polymeric nanoparticles stand out as a key tool to improve drug bioavailability or specific delivery at the site of action. The versatility of polymers makes them potentially ideal for fulfilling the requirements of each particular drug-delivery system." (Begines, 2020). Metallic nanoparticles greatly improve visibility of internal structures for exams such as CT and Fluoroscopy. The application of nanoparticles does not stop there. Researchers want to use nanoparticles to help deliver drugs to patients in the safest way possible. To come to this conclusion, various materials and coatings of nanoparticles were tested for ocular disease drug delivery as well as cancerous disease drug delivery. The WHO states 2.2 billion people have some sort of Ocular disease, and one billion cases could have been stopped with proper treatment. This statistic drove the desire to specifically test drug delivery systems (DDS) for ocular diseases. Testing was therefore done on Micelle nanoparticles for ocular delivery.

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Female Agency Under Patriarchal Influence in Art: An Analysis of Francesca Caccini's La Liberazione di Ruggerio dall'isola d'Alcina

Research Paper by
ZOHA HAIDER

MUSIH 1307: HONORS MUSIC LITERATURE

In her paper "Female Agency Under Patriarchal Influence in Art: An Analysis of Francesca Caccini's La Liberazione di Ruggiero dall'isola d'Alcina," Zoha Haider explores the rich feminist themes present in Caccini's opera, which was composed for the Medici court during a rare period of female rule at the turn during the early Baroque Era. In the writing, Haider identifies themes that are at times overt and at other times hidden, ultimately highlighting how Caccini's background and lived experience shaped the ways in which the opera was crafted.

- Reese Burgan

Abstract

This paper analyzes the restrictions of female agency experienced within a strict patriarchal society in 17th century Italy by examining the plot of *La Liberazione di Ruggerio dall'isola d'Alcina* by Francesca Caccini to show the relationship of her defiance of gender roles and the political context of the Medici court to produce this operatic work *La Liberazione*. This analysis seeks to reveal the dynamic between good and evil personified, used to represent the struggle for equality between the sexes during this time and the female characters of *La Liberazione*. The plot of this operatic work details personal strife she faced as a composer as well as served as a powerful political and social message to the viewers. The opera explores the relationship that women have with power through an allegory of divine war between good and evil.[1] Caccini exemplifies the role of these women in the plot of the story by giving each magical abilities, which acme to the greater liberation of the key characters to conclude the piece. Her story reflects exaggerated themes of the quiet fight for agency that women at the time experienced. The creation of this opera was commissioned by two female patronages of the Medici court, who also sought to legitimize their power through the arts. This paper seeks to reveal the true intention of this opera by analyzing the philosophical and political context regarding Caccini's life that served as a catalyst for this production. Through analysis of plot, political context, and biographical accounts of Francesca Caccini's life, the aim is to argue that *La Liberazione* should be interpreted as a landmark feminist opera of classical music.

1. Grethe Holmen, Kvindelige Kunstnere i 1500- Og 1600-Tallet: Forfattere, Malere Og Komponister (Women Artists in the 16th and 17th Centuries: Writers, Painters and Composers), review, Woman's Art Journal 4, no. 2 (1983): 49–50. https://doi.org/10.2307/1357948.

Introduction

Opera has long been a medium to express stories that appeal to the aristocratic class. Access to the arts has been restricted by wealth, especially before and during the classical music period. The Medici Court of the 17th century is no exception. The influence of this opera, *La Liberazione*, reflects the curated impression of prowess demanded by the royal patrons of this piece. The implications of female empowerment expressed in the dialogue, plot, and subtle subversions of stereotypes convey a message to its viewer; a true leader defies their gender and rules with an undeniable essence of virtue. The analysis of this opera seeks to unveil its purpose of instating feminine power by careful consideration of the opera and its patrons.

Histography of Medici Court Grand Ducal Regime and Aesthetic Symbolism

Gabrielle Langdon explores the lives of the women in the Medici family in her publication *Medici Women: Portraits of Power, Love and Betrayal from the Court of Cosimo I*. Langdon examines the painted portraits of these women and the relationship between appearance and power. She draws parallels between the art's imagery and historical implications for each detail. Her analysis delves into the complexities of symbolism and sternly states, "all genres of portraiture for women of Cosimo's court ... a strong element of propaganda informs every one."[3] Her interpretations of women in Medici royal portraits furthered the discussion of the role of females in advancing political agenda. Another layer of artistic expression that Langdon highlights is the importance of patronage. In some cases, the portraits were commissioned by the women themselves, and these artworks depicted different aspects of them compared to the art commissioned by their fathers or husbands. The ideals that these women sought to portray may have defied the existing expectations. Langdon notes that the difference of details that implicate varying expressions of female agency were not lost on the viewers of these works at the time.[4]

Janet Cox-Rearick, in her paper *Power-Dressing at the Courts of Cosimo de'Medici and Francois I: The "moda alla Spagnola" of Spanish Consorts Eleonore d'Aitriche and Eleonora di'Toledo*, writes on the importance of appearance in political rivalry. Cox-Rearick remarks on the fight for power expressed through fashion between France and Italy in royal events. She focuses on the consorts of King Francois as a message of Spanish pride and disapproval of her forced marriage to him. The usage of fashion as an expression of agency is reflected in performance art and political assertion alike. The implication of wearing the attire of her home country the consorts of King Francois as a message of Spanish pride and disapproval of

2. Anna Beer. Sounds and Sweet Airs: The Forgotten Women of Classical Music. London: Hodder & Stoughton, 2020.
3. Holly S Hurlburt. "Medici Women: Portraits of Power, Love and Betrayal from the Court of Cosimo I." Journal of the History of Sexuality 19, no. 3 (2010): 583+. Gale OneFile: World History. https://link-gale-com.lscsproxy2.lonestar.edu/apps/doc/A238194374/PPWH?u=nhmccd_main&sid=bookmark-PPWH&xid=8ae9f584).
4. Holly S Hurlburt, "Medici Women: Portraits of Power, Love and Betrayal from the court of Cosimo I." Journal of the History of Sexuality 19. No. 3 (2010)

her forced marriage to him. The usage of fashion as an expression of agency is reflected in performance art and political assertion alike. The implication of wearing the attire of her home country rather than adoption of her husband's culture shows how women at the time were restricted in their ability to openly express themselves in words. Public appearances with these statements may have been subtle but not unnoticed to the aristocrats of the time.[5]

Another article, Medici Women: *The Making of a Dynasty in Grand Ducal Tuscany* written by Gregory Murry, reflected on the significance of the *donne*, noble women, through the course of two centuries of the grand ducal regime in Italy. In this publication, he highlights the importance of these women who married into the Medici court from foreign royal families for political alliances and how they remained as agents to their respective homelands. These women continued to promote their culture and traditions in their new households after marriage to the best of their ability. This resilience to advocate for their own history, instead of the erasure of themselves for the adoption of their husbands' families' traditions, proved a shift in the perspective of female agency among the aristocratic class of the time. These women served more than a mere political alliance through marriage and extended their role into becoming an active diplomat for their countries of origin.[6] This contempt for the adherence to servitude and reservation of spirit that was demanded by the culture at the time is noted by other historians that focus on this topic.[7]

Murry assessed the works of other historiographers including Shiela Barker and others who wrote on Christine de Lorraine's dedication to chemistry outside of her role of caretaker and wife. Barker explains that the Duchess exceeded her role as a female and used her status to influence the progressive scientific movement of the time.[8] These women were part of a larger movement, where women's agency was being pressured into existence by the few who were able to push forward the agenda. Still, their contributions were rarely explicitly outspoken and were mainly creatively expressed through art to their audiences.

2. Janet Cox-Rearick. "Power-Dressing at the Courts of Cosimo de' Medici and François I: The 'Moda Alla Spagnola' of Spanish Consorts Eléonore d'Autriche and Eleonora Di Toledo." Artibus et Historiae 30, no. 60 (2009): 39–69. http://www.jstor.org/stable/25702881.
3. Gregory Murry, "Medici Women: The Making of a Dynasty in Grand Ducal Tuscany," The Historian 79, no. 3 (2017): 618+, accessed May 7, 2026, https://link-gale-com.lscsproxy.lonestar.edu/apps/doc/A508103910/PPWH?u=nhmccd_main&sid=bookmark-PPWH&xid=e77097f1.
4. Coral Carlson, Giovanna Benadusi, and Judith C. Brown. Medici Women: The Making of a Dynasty in Grand Ducal Tuscany. Essays and Studies 36. Renaissance Quarterly 69, no. 2 (2016): 703–5. https://www.jstor.org/stable/26559835.
5. Gregory Murry. "Medici Women: The Making of a Dynasty in Grand Ducal Tuscany." The Historian 79, no. 3 (2017): 618+. Gale OneFile: World History. https://link-gale-com.lscsproxy2.lonestar.edu/apps/doc/A508103910/PPWH?u=nhmccd_main&sid=bookmark-PPWH&xid=e77097f1.

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The Evolution of Toru Takemitsu: The Philosophy of his Music Through Coming to Terms with his Heritage

Research Paper by
DEAN VINER

MUSI 1307: MUSIC LITERATURE

In "The Evolution of Tōru Takemitsu: The Philosophy of His Music Through Coming to Terms with His Heritage," Dean Viner examines the cultural and aesthetic trajectory of renowned Japanese composer Tōru Takemitsu. Situating Takemitsu within his sociohistorical context, Viner highlights how the composer reconciled competing tensions between Western classical traditions and his Japanese musical heritage.

- Reese Burgan

Tōru Takemitsu is widely regarded as one of the most important Japanese composers of the twentieth century. He was among the first composers of western music in Japan to achieve international success, and he is considered successful in his pursuit of marrying western classical music with Japanese traditional music, philosophy, and aesthetics. For many years, however, Takemitsu outright rejected the traditions, culture, and music of Japan. This was due to several factors, including the rapid westernization—to the point of mania—of Japan before and following World War II, and his own traumatic experiences as a young conscript during the war. It would not be until his meeting with John Cage—an American composer deeply interested in eastern philosophy—in the 1960s that Takemitsu would begin to reexamine his views towards his own culture. And as he began to explore Japanese traditional music, Takemitsu found that it offered solutions to some of his frustrations with the thought processes that arise from western notation. The following paper aims to document and explain the changes in Takemitsu's struggle with his birth culture in four parts, namely: the environment created by changes to Japanese society in the 19th and 20th centuries, Takemitsu's experiences in his early life, his change of heart in the 1960s, and a survey of the relationship between Takemitsu's own views on aesthetics and the musical philosophies of the east and west. Ultimately, it will become clear that his evolution is one of philosophical reconciliation rather than a naïve mixture of eastern and western musical elements.

By the time Takemitsu was born in 1930, Japan had already been exponentially westernizing for nearly eighty years. Following more than two centuries of isolationist policies mandated by the Tokugawa shogunate, the arrival of "Commodore Matthew Calbraith Perry of the United States Navy…into Uraga harbour with his powerfully armed ironclad steamboats" on July 8, 1853 would lead to a foreign policy breakthrough that would ultimately cause rapid westernization and the decline of tradition.[1] Following a trade agreement between Perry and Japanese authorities, multiple other nations began to negotiate similar treaties and, within fifteen years, the last shogun resigned and the emperor was reinstated as the head of state in what would become known as the *Meiji Restoration*; in its wake followed a "craze for wholesale Europeanisation."[2] As Japan continued to westernize, western music began to insert itself into Japanese culture and musicians were sent to study in Europe and the United States in order to bring back their findings and improve music education—a mandatory part of schooling in Japan at this point. It should be noted that although traditional music still existed in Japan, music attempting to synthesize eastern and western modalities still showed clear western favoritism with much of it following the unsatisfactory approach of using "[f]amous [w]estern tunes supplied with Japanese lyrics;" furthermore, in the "original intention that traditional Japanese and [w]estern music should be studied alongside one another,…the former option was gradually abandoned, to be revived again only after the Second World War."[3]

As a result of increased nationalism and militarism, "throughout World War II nearly all [w]estern music was prohibited in Japan," and traditional Japanese music became a propaganda tool to promote national pride.[4] Militarism deeply affected all aspects of life, and it was even common for schools to double as factories where children would work. Despite the ban on western media, the Japanese public still had great interest in westernism and would smuggle in western products and spread them about. Takemitsu's wife, Asaka Takemitsu, recalled of her brother-in-law, a customs officer, "[a]fter the war started, American films were seized by the Yokohama customs office. One of those films was *Gone with the Wind*, so he saw it secretly at his work. At my girls' school, we secretly passed around books such as *Gone with the Wind* and *Rebecca*. Even those kinds of books were censored."[5] It had become quite clear that the government's efforts to establish patriotism via traditionalism had, for many, fallen on deaf ears and that the rise of westernism could not be stopped.

When Takemitsu was one month old, he and his family moved to Dalian, modern day China, which at the time was in the Japanese region known as Manchuria. "Within Japan, militarism created a tense atmosphere, but it was rather more liberal overseas," so Takemitsu and his family experienced a much laxer environment than those back on the mainland.[6] He grew up with the sounds of his father's American jazz records, which would have been his first experiences with western music. Takemitsu already displayed a western favoritism as "[f]rom the time [he] was very young [his] entire family were great movie fans; [they] particularly loved seeing American movies," and "[i]t was while viewing these films that [he] came to recognize the great differences that existed between the culture of [Japan]

1. Peter Burt, *The Music of Tōru Takemitsu* (Cambridge: Cambridge University Press), 4
2. Ibid., 6-7
3. Ibid., 11
4. Tōru Takemitsu, "Contemporary Music in Japan," *Perspectives of New Music* 27, no. 2 (1989): 199
5. Asaka Takemitsu, *A Memoir of Tōru Takemitsu* (Bloomington: iUniverse), 40
6. A. Takemitsu, *Memoir of Tōru Takemitsu*, 37

and that of America. America appeared like a great, shining dream."[7] At the age of seven, Takemitsu decided to return alone to Japan for school. Back on the mainland, he stayed in Tōkyō with his uncle and his aunt, "a *koto* [a type of Japanese zither] master of the Ikuta School."[8] Takemitsu heard her play frequently and recalled, "[f]or some reason it never really appealed to me, never moved me."[9] Not only was he not moved by the playing, his wife even claimed of his aunt and uncle that "[s]ince they lost their two sons in the war, his aunt's *koto* playing was always somber and lonely, and Tōru often overheard the couple arguing. So Tōru had bitter memories of the *koto*."[10]

At the age of fourteen, Takemitsu's formal education was interrupted by his conscription into the Japanese military. Although he never saw combat, he claimed, "the experience was an extremely bitter one. We were not real soldiers, and the soldiers treated us very harshly."[11] This would become the crux of his disdain for Japanese culture and government; for more than a decade afterwards, Japanese music would remind him of his time in the military and the earlier mentioned use of traditional music as propaganda. Takemitsu himself wrote, "[b]ecause of World War II, the dislike of things Japanese continued for some time and was not easily wiped out. Indeed, I started out as a composer by denying any 'Japaneseness.'"[12] For the rest of his life, Takemitsu would retain an aversion to nationalism in all forms. Even though western media had been banned, one of Takemitsu's superiors had smuggled in a record which he managed to play on a record player with a makeshift, bamboo needle. The record was of Lucienne Boyer's performance of Jean Lenoir's chanson, "Parlez-moi de l'amour," and Takemitsu recalled of the experience, "when I heard that French chanson at a time when all examples of [w]estern culture had been shut out from our lives, this experience released in me enormous energy. Energy really exploded within me, and it's interesting that, at that time, the object of my attention was not Japanese but [w]estern."[13] Although Takemitsu had certainly experienced western music before the war, the escapism it provided from his miserable condition profoundly affected his relationship with it. This was likely the moment that created his obsession and eventual desire to engage with and create western classical music. During the American military occupation after the war had concluded, Takemitsu worked for the US Armed Forces before he fell deeply ill with tuberculosis in 1953 and was forced to stay in a hospital, bedridden, for one year. During this time, he "listened constantly to American music over the Armed Forces Radio [and] also went very, very frequently to the library of the Civil Information and Education branch of the U.S. Occupation government. There [he] also sought out American music."[14]

7. T. Takemitsu, "Contemporary Music in Japan," 200
8. A. Takemitsu, *Memoir of Tōru Takemitsu*, 30
9. T. Takemitsu, "Contemporary Music in Japan," 200
10. A. Takemitsu, *Memoir of Tōru Takemitsu*, 30
11. T. Takemitsu, "Contemporary Music in Japan," 199
12. Tōru Takemitsu, *Confronting Silence: Selected Writings* (Berkeley: Fallen Leaf Press), 53
13. T. Takemitsu, "Contemporary Music in Japan," 200
14. Ibid.

Even before his hospitalization, Takemitsu had already decided that he wanted to be a composer of new music. By 1951, he had already had two pieces premiered and had assisted with the founding of *Jikken Kōbo*, meaning "experimental workshop," a sort of avant-garde experiment combining new works from multiple disciplines of art and introducing them to Japan. Takemitsu's 1957 *Requiem for Strings* would bring him international attention after it "received the highest praise from [Igor] Stravinsky."[15] Stravinsky would become the first of many important figures in western music that Takemitsu would meet during his lifetime.

Before his first meeting with John Cage, Takemitsu was already aware of and deeply influenced by his work. Some of his early film scores include the usage of prepared piano, and the score for his 1961 composition, *Ring*, "incorporates two radical innovations of Cage with which Takemitsu continued to be preoccupied in a number of works over the course of the next few years: indeterminacy and graphic notation."[16] While such direct usage of Cage's musical inventions would eventually wear off, many of his philosophies and "ideas were to remain essential tenets of faith for Takemitsu for the remainder of his creative life;" the ideas of "silence as *plenum* [fullness] rather than *vacuum* [emptiness]" and "the preference for the individual timbre of the single sound-event" will become especially relevant in the fourth part of this paper discussing the relation between Takemitsu's views on aesthetics and those of western and eastern philosophy.[17] Takemitsu would eventually meet and become great friends with Cage. His connection with Cage and exploration of his ideas regarding eastern philosophy would become a major turning point in his life. In his own words, "I must express my deep and sincere gratitude [sic] to John Cage…It was largely through my contact with John Cage that I came to recognize the value of my own tradition."[18]

Around the same time that Takemitsu met with Cage, he had a similarly transformative experience: his attendance of *bunraku*—a traditional puppet show featuring narrator and musical accompaniment, mainly by *futozao*, a special type of *shamisen*, which is a Japanese instrument similar to a banjo. Perhaps he had an epiphany just like his first hearing of the French chanson in his barracks during the war, as he said of the experience, "the *gidayū* [the specific style of accompaniment] of the *bunraku* that I happened to hear—especially the intensity of the melodies and the rhythm of the *futozao*—made me aware of a completely different world of music. The world of sound created by the *futozao* was no less impressive than the world of the [w]estern orchestra with its hundred different instruments. Perhaps to me it was even richer."[19] Takemitsu would go on to study traditional Japanese instruments, producing first *Eclipse* (1966)—for *biwa*, Japanese lute, and *shakuhachi*, Japanese flute—and eventually culminating in

15. A. Takemitsu, *Memoir of Tōru Takemitsu*, 25
16. Burt, *Music of Tōru Takemitsu*, 92-93
17. Ibid., 95-96
18. T. Takemitsu, "Contemporary Music in Japan," 199
19. T. Takemitsu, *Confronting Silence*, 53

November Steps (1967) for orchestra, *biwa*, and *shakuhachi*. It is in *November Steps* that we begin to see his reconciliation of eastern and western music.

In preparing to compose for *biwa* and *shakuhachi*, which did not have a standard form of notation in western music, Takemitsu chose to combine existing ideas from graphical and proportional notation with symbols from traditional forms of tablature and symbols that he developed himself. While the orchestra part of *November Steps* is always written using traditional notation, the parts played by Japanese instruments switch back and forth between traditional and Takemitsu's hybrid notation.[20] This compositional method of comparing and contrasting Japanese and western music may at first appear as simply presenting elements of both cultures; however, Takemitsu's hybrid notation system allows him to express ideas fundamental to Japanese aesthetic philosophy: timelessness and an emphasis on the importance of timbre over pitch.

As Takemitsu puts it, "my impression of *gagaku* [Japanese court music] was that of a music that challenges measurable time…*Gagaku* lacks the concept of beat in [w]estern terms."[21] His use of proportional notation allowed him to eschew beats and leave duration up to the performer almost entirely. In practice, this includes both the duration of audible sound and of silence, meaning that resonance controls pacing instead of beat. This is heavily related to the Japanese concept of *ma*, which is the structural and aesthetic importance of negative space. "[*M*]*a* is an expressive force which fills the void between objects separated in time or space."[22] In other words: silence is *energized*; it is full rather than empty—*plenum* vs. *vacuum*. Takemitsu brought the difference in the treatment of silence between Japan and the west, as well as his own frustrations, to light when he wrote, "[w]estern music has been carefully classified within a narrow system of sounds, and its presentation has been systematically notated. Rests within a score tend to be placed with mathematical compromises. Here the sound has lost its strength within the limitation of functionalism."[23] This idea of the strength of a sound is related to Takemitsu's views on the importance of timbre and nature. He expands on this idea thus, "I wish to free sounds from the trite rules of music, rules that are in turn stifled by formulas and calculations. I want to give sounds the freedom to breathe. Rather than on the ideology of self-expression, music should be based on a profound relationship to nature—sometimes gentle, sometimes harsh."[24] While this echoes ideas of some types of western music in the 20th century, it is certainly far removed from the traditional concepts of melody and harmony that formed the basis of western music for centuries.

Tōru Takemitsu was a giant of the Japanese world of classical composers.

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20. Toru Takemitsu, *November Steps* (New York: C.F. Peters Corporation, 1967)
21. T. Takemitsu, *Confronting Silence*, 6
22. Timothy Koozin, "Toru Takemitsu and the Unity of Opposites," *College Music Symposium* 20, no. 1 (1990): 36
23. T. Takemitsu, *Confronting Silence*, 7
24. T. Takemitsu, *Confronting Silence*, 4

His personal development through the rejection and later advocacy of his own culture fostered a unique sound that led to international acclaim. His experiences during World War II tainted his already pessimistic views towards his heritage, but his friendship with John Cage helped to reawaken it. Japanese aesthetics allowed him to overcome his own frustrations with the limitations of traditional western notation and to develop a merged artform that went beyond a mere copying of the sounds present in both cultures—an artform that resolved the seemingly incompatible philosophies of east and west. Readers of this paper are encouraged to listen to Takemitsu's incredible output and to further their research on their own time. The books and articles cited here are an excellent place to start. Some suggested topics are the following: a further study of specific techniques used by Takemitsu, Japanese and western aesthetics in his music for film, how Japanese aesthetics may have enhanced the Messiaen and Debussy-based, highly sensuous, late period of his oeuvre, and how other Japanese composers of the same generation may have similarly struggled with and attempted to resolve their own cultural friction. Above all else, Takemitsu's journey stands as a testament that reconciliation is always achieved foremost by understanding.

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Early Maladaptive Schema (EMS) Formation in Transgender Women: A Diathesis-Stress Application

Research Paper by
CLOVER GERBER

PSYCH 2301: HONORS INTRODUCTION TO PSYCHOLOGY

In this paper, Clover investigates the utility of viewing early maladaptive schema formation in transgender women through a diathesis-stress lens. Their analysis draws on many subfields of psychology, including personality, social and socio-cultural, cognition, and psychopathology. As this paper focuses on a historically understudied and under-represented population, Clover's insights offer a potential framework for future interventions designed to improve mental health outcomes across other minority and/or marginalized groups. This paper has been presented at local, regional, and national conferences and serves as an excellent example of writing in psychological science.

- David Oviatt

Abstract

This study proposes an application of the diathesis-stress model to examine early maladaptive schema (EMS) formation in transgender women to elucidate psychopathological precursors in queer populations. Although researchers frequently explore EMSs' ability to predict various psychological disorders, few studies utilize a diathesis-stress lens to examine EMS development. The diathesis-stress model is used to establish a baseline understanding of both preexisting vulnerabilities (diatheses) and environmental variables (stressors) responsible for EMS formation in transgender women. Following a semi-meta-analytic review of EMS literature, several thematic areas are identified then categorized as either diatheses or stressors. The analysis classifies personality traits of neuroticism, low agreeableness, negative affectivity, psychoticism, and detachment as diatheses alongside the stressors of interpersonal problems, abuse, trauma, depressive symptoms, and minority stress. Scholarly findings based on Hankin & Abramson's (2001) cognitive vulnerability-transactional stress theory are also incorporated to highlight the bidirectional relationships between EMSs, depressive stressors, and depressive symptoms. Lastly, Ilan H. Meyer's (1995) minority stress theory is applied to contextualize the model within queer- and minority-focused literature. Overall, the aforementioned stressors identified by this study are numerous and varied, whereas only select personality traits are identified as diatheses. This finding suggests the formation of EMSs in transgender women may be tied to a wider variety of environmental variables, though it should not be assumed a larger number of stressors equates to greater predictive validity. Further research should include an evaluation of resilience factors in EMS formation, potentially utilizing diathesis-stress expansive models, to further inform schema therapy interventions.

Introduction

One of the most common tools of modern psychology used to examine the development of psychological disorders is the diathesis-stress model. According to the model, certain psychological disorders arise when an individual's diatheses, typically biological or psychological predispositions, are combined with stressors, or environmental factors. Proposed by Paul Meehl in 1962 and modernized by Marvin Zuckerman in 1999, the model finds much of its continued support from twin studies such as Yoon-Mi Hur's (2024) study on gaming addiction in late adolescence and Colodro-Conde et al.'s (2017) evaluation of the diathesis-stress model for depression. While studies such as Kendler et al.'s (2002) question the universal applicability of the diathesis-stress model, the model provides insight into the biospsychosocial interactions preceding the development of various psychopathologies.

Early maladaptive schemas (EMSs) are cognitive features frequently associated with psychopathological development. According to Chen et al. (2023), EMSs are substantial, negative beliefs held by an individual impacting nearly every aspect of life. EMSs were first described by foundational scholars Jeffrey Young, Janet Klosko, and Marjorie Weishaar (2003) who propose children exhibit certain basic needs, including connection, emotional validation and free speech, senses of competency and autonomy, leisure and spontaneity, self-control/realistic limitations.[1] Failure to meet one or more of the identified basic needs often results in EMS formation (Young et al., 2003). A recent study has arranged Young et al.'s (2003) 18 EMSs (Emotional Deprivation, Social Isolation/Alienation, Emotional Inhibition, Defectiveness/Shame, Mistrust/Abuse, Pessimism, Dependence/Incompetence, Failure to Achieve, Subjugation, Abandonment/Instability, Enmeshment, Vulnerability to Harm, Self-Sacrifice, Unrelenting Standards, Self-Punitiveness, Entitlement/Grandiosity, Approval Seeking, and Insufficient Self-Control) into the four domains of Disconnection & Rejection, Impaired Autonomy & Performance, Excessive Responsibility and Standards, and Impaired Limits (Bach et al., 2018, as cited in Lockwood & Perris, 2012). Scholars identify Young et al.'s (2003) 18 EMSs as contributors to the development of various psychological disorders, some of whom utilize the diathesis-stress model to do so (Eberhart et al., 2011; Vasilopoulou et al., 2020; Zheng et al. 2022). However, few studies apply the diathesis-stress model to the examination of EMS formation. With an aim to promote awareness of psychopathological predictors in queer populations, this study proposes an application of the diathesis-stress model to examine the formation of EMSs in transgender women. This research concludes transgender women experience relatively few diatheses in comparison to many stressors, each of which may contribute to EMS development.

In addition to basic need deficiencies identified by Young et al. (2003), several other salient factors are examined as potential contributors to EMS development. One such factor is interpersonal problems with a focus on parental relationships.

1. Arntz et al.'s 2021 study proposed the additional needs of self-coherence and justice (Cardoso et al., 2023).

A meta-analysis by Janovsky et al. (2020) identifies a moderate positive correlation between EMSs and interpersonal problems which are defined as any psychological distress caused by relationships with others (Mojallal et al., 2015). Highlighting a specific interpersonal problem, several scholars associate EMS formation with poor parental relationships (Zafiropoulou et al., 2014; Akbari et al., 2024; Başer Baykal & Erden Çınar, 2023). Though a poor maternal bond is frequently associated with EMS formation (Akbari et al., 2024; Zafiropoulou et al. 2014), studies also connect paternal issues such as overprotection, authoritarian parenting, physical or emotional absence, and fathers coping with personal trauma with EMS development (Zafiropoulou et al., 2014; Başer Baykal & Erden Çınar, 2023). The significance of these findings is strengthened by McCarthy & Lumley's (2012) study identifying parental emotional maltreatment as the most profound predictor of EMS development, and Başer Baykal & Erden Çınar (2023) propose a causal relationship between dysfunctional parenting and EMS formation. Such a relationship, if it existed, would likely exacerbate the presence of EMSs among transgender women, as queer individuals commonly experience rejection from their parents upon coming out (Schmitz & Tyler, 2021).

Scholars also examine the relationship between bullying, a specific interpersonal problem, and EMS formation, highlighting a potential bidirectional relationship. Key studies by Calvete (2014) and Calvete et al. (2016) identify both bullying victimization and cyberbullying as predictors of EMS intensification. However, the most salient conclusion regarding interpersonal problems and EMS formation is Calvete et al.'s (2018) proposal of EMSs as a mediator between various interpersonal problems and bullying victimization, another increasingly common experience among transgender youth (Sares-Jäske et al., 2023; Gay, Lesbian, and Straight Education Network, 2020; Abreu & Kenny, 2018). The authors suggest EMSs may both result from and perpetuate interpersonal problems, and is supported by Tezel et al.'s (2015) study identifying EMSs as a mediator between childhood abuse and adult interpersonal styles. The relationship between interpersonal problems and EMSs is complex, likely involves dysfunctional parenting, likely manifests in higher intensity for transgender individuals, and may exhibit bidirectionality.

Further examining the cognitive implications of interpersonal problems, scholars debate the association of sexual, physical, and emotional abuse with EMSs. While several researchers associate abuse with EMS formation (May et al., 2022; Pilkington et al., 2021; Fathi et al., 2023; Zheng et al., 2022), not all scholars agree on the associative properties of each type of abuse. While Pilkington et al. (2021) and Fathi et al. (2023) suggest each type of abuse is associated with EMS development, and Sieński & Ziarko (2022) identify a positive correlation specifically between physical abuse and EMS intensity, Zheng et al.'s (2022) study does not find physical abuse to be associated with schema formation—indicating scholarly disagreement on the role of physical abuse in EMS development. While the impact of physical abuse on EMSs is called into question, Fathi et al. (2023) find emotional abuse/neglect exhibits the strongest association with EMS formation in comparison to physical and sexual abuse. Fathi et al.'s (2023) observation exhibits critical implications for the transgender experience; one study of transgender women in Rio de Janeiro, Brazil reported over 60% of participants experienced emotional abuse (Rafael et al., 2024). To contextualize the link between abuse and EMSs, EMSs are frequently described as a mediating variable—meaning abuse is a predictive variable of later psychological or interpersonal challenges only to the extent EMSs contribute to these later ailments (Estévez et al., 2016; Fernando et al. 2024; Zheng et al., 2022; Calvete, 2014; Da Costa et al., 2020; Mojallal et al. 2021; Gong & Chan, 2018). Such findings highlight the critical role of EMSs in the development of psychopathologies and advocate for further research examining the relationship between abuse and EMS formation.

Fortunately, a handful of scholars conduct explorative analysis to extensively characterize relationships between EMSs, abuse, and depressive symptoms. Through a two-wave longitudinal study of adolescents, Wang et al. (2023) find childhood abuse and neglect does not directly cause EMSs. Instead, the authors argue childhood abuse and neglect cause depression which then causes EMS formation. Interestingly, Wang et al.'s (2023) findings are similar to Calvete et al.'s (2013)---in an application of Hankin & Abramson's (2001) cognitive vulnerability-transactional stress theory, Calvete et al. (2013) confirm bidirectional relationships between cognitions, stressors, and depressive symptoms in adolescents. Calvete et al. (2013) found this relationship occurs as follows: depressive symptoms and select EMSs predict an increase in stress—the stress and accumulated depressive symptoms then predict a worsening of the investigated EMSs. Furthermore, May et al. (2022) observe, in their study identifying a correlation between childhood abuse and EMSs, EMS formation may impact an adolescent's ability to balance their needs of belonging and autonomy. However, Young et al. (2003) identified failure to meet a child's basic needs as a primary factor resulting in EMS formation, further supporting the bidirectional model of EMS development. Such bidirectional potential between EMSs, stressors, and depressive symptoms may be exacerbated for the transgender community which experiences heightened levels of depression (Jäggi et al., 2018). Through complex research involving multivariable inquiry, Wang et al. (2023), Calvete et al. (2013), and May et al. (2022) highlight the possibility of the relationship between EMSs and their potential diatheses/stressors being more complex than simple correlation or causality.

While examining another variable's potential relationship to EMSs, researchers also identify a link between traumatic experiences and EMS development, though this relationship is mostly explored indirectly. Though the trauma's predictive validity toward EMSs may overlap with that of abuse, it should be noted this study utilizes *abuse* and *trauma* as distinct terms.[2] While few scholars examine the specific relationship between trauma and EMSs in detail, several scholars identify links between trauma and psychological difficulties such as intensification of eating

2. This research uses *abuse* to refer to objective maltreatment from an external source, while *trauma* characterizes an experience exhibiting significant negative consequences on an individual's mental health. While adverse experiences are commonly classified as both abuse and trauma, individuals can experience abuse without the experience being traumatic and experience trauma not classified as abuse.

disorder symptoms (Fasolato et al., 2024; Meneguzzo et al., 2021), maladaptive interpersonal styles (Tezel et al., 2015), alexithymia[3] (Feyzioğlu et al., 2023), general psychiatric symptoms (Da Costa et al., 2020), and complex post-traumatic stress disorder (Vasilopoulou et al., 2020) with EMSs as a mediating variable. Other than the identification of an association between trauma and EMSs, little can be concluded about the potential nuances of this relationship. However, future scholars should examine trauma and EMS formation through the lens of Hankin & Abramson's (2001, as cited in Calvete et al., 2013)[4] cognitive vulnerability-transactional stress theory which may provide insights on the established relationship between trauma and EMS formation.

In addition to traumatic experiences, a less-explored yet equally salient scholarly thread is the characterization of a link between personality traits and EMS development. Expanding upon the widely cited 5 Factor Model of Personality, Thimm (2010) identifies a positive correlation between neuroticism and EMS formation, and Ehsan & Bahramizadeh (2011) observe a negative correlation between agreeableness and presence of select EMSs. Brudek et al. (2023) take this inquiry a step further with their identification of EMSs as a mediator between the personality traits of neuroticism, negative affectivity,[5] psychoticism,[6] detachment, and an individual's tendency to forgive. The mediating role of EMSs, as observed in Brudek et al.'s (2023) study, highlights the capability of select personality traits to impact EMS formation. However, one of the most intriguing investigations of personality in relation to EMSs is Calvete's (2014) study which identifies both neuroticism and emotional abuse as predictors of EMS formation. Calvete's (2014) study exhibits direct implications on this study's model by identifying both a diathesis (personality, specifically neuroticism) and a stressor (emotional abuse) found to play significant roles in EMS development. Furthermore, preliminary study has identified disproportionately high scores on the clinical personality assessment tool Minnesota Multiphasic Personality Inventory (MMPI) among transgender people assigned male at birth (AMAB), indicating high levels of psychological vulnerability and increasing the likelihood of EMS development (Liu et al., 2024). The existing scholarly conversation surrounding personality and EMS development highlights a salient correlation and may exhibit unique effects on EMS formation in transgender women.

3. Alexithymia is defined as difficulty in recognizing, characterizing, and expressing one's emotional experiences (Feyzioğlu et al., 2023).
4. This study utilizes indirect citations only for unavailable materials.
5. Negative affectivity is characterized by abnormally high levels of worry. Negative affectivity differs from neuroticism because it is considered a dysfunctional personality trait whereas neuroticism is present, to varying degrees, in all personalities (Brudek et al., 2023).
6. Psychoticism is a dysfunctional personality trait marked by feelings of derealization or hyperrealization of the self and/or environment (Brudek et al., 2023).

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Learning Disabilities in Children and Adults

Essay by KATIE MCLEOD

PSYC 2301: GENERAL PSYCHOLOGY

This paper explores several learning disabilities including dyslexia, ADHD, and auditory processing disorders. Ms. Katie McLeod analyzes this topic from both an academic research perspective and personal experience. She reviews how learning disabilities are neurological impairments that can affect children of average to above-average intelligence, and analyzes misconceptions often associated with these conditions. The paper concludes with a thoughtful future reflection, stating that Katie's understanding of her own experiences better equips her to pursue her goal of becoming a Child Life Specialist, where this knowledge will allow her to serve children with similar challenges more effectively.

- Marla Moreno-Jordan

Learning disabilities affect many adults and children around the world. "Learning disabilities (LD) are considered specific neurological impairments rather than global intellectual or developmental disabilities." (Spielman et al., 2020, section 7.6, para 9). Some learning disabilities, like dyslexia, are well known. Others, like auditory processing, are less common but also affect how a person learns. Even though many people have heard of dyslexia, dysgraphia, or dyscalculia, they do not always grasp the impact these can have on learning. While attention deficit/hyperactivity disorder (ADHD) is not considered a learning disability, I include it here because it can make dealing with learning disabilities more difficult. I will use chapter 7, "Thinking and Intelligence," from Spielman et al (2020) as my primary resource, along with additional material from chapters 10 and 15.

I chose learning disabilities because formal education and schoolwork have always been challenging for me, as I have been diagnosed with multiple learning disabilities. People frequently assume that students with learning disabilities are lazy or lack intelligence, but this is a misconception. Students with LD simply process and engage with information differently. Students with LDs do not have a lower intelligence quotient (IQ) (a score on a test designed to measure intelligence) and, in fact, learning disabilities "...most often affect children with average to above-average intelligence." (Spielman et al., 2020, section 7.6, para. 10). Young students with learning disabilities often express their frustration in ways that may appear to be behavioral or disciplinary problems when, in reality, they are struggling with tasks that do not accommodate their learning style. They can also be unfairly punished just for having learning disabilities. For example, in second grade I was regularly removed from recess, art, and music classes and forced to complete classwork because I could not finish assignments at the same pace as my peers.

The most common learning disability in children is dyslexia. The brain of an individual with dyslexia has difficulty correctly processing letters and sounds (Spielman et al., 2020). Some people believe dyslexia is just flipping letters like confusing 'b' and 'd.' However, dyslexia is more complex than this. Children with dyslexia do not understand the basics of language. One significant challenge is that children with dyslexia struggle with phonemes, which is a basic sound unit of a given language (Spielman et al., 2020). When these foundational language skills are compromised, comprehension becomes increasingly difficult as words grow more complex. In my own experience, when I encounter an unfamiliar word, I struggle to pronounce it, and most of the time I just must memorize words and the English rules. For example, the rule that says we do not pronounce the 'K' in Knox and know. I often struggle with the words so much that I forget the sentence and must reread the same section several times. I am constantly going back and forth between the story being told and the words in the sentence. This constant back-and-forth between overall meaning and individual words is what makes reading a slow and demanding process for someone with dyslexia.

When people think about attention deficit hyperactivity disorder (ADHD), they picture a bouncy kid who cannot sit still or the daydreamer who gets lost in their own thoughts. ADHD is defined as a "disorder characterized by inattentiveness and/or hyperactive, impulsive behavior" (Spielman et al., 2020). It is important to help children with ADHD get treatment and develop effective coping strategies since untreated ADHD may create difficulties that persist throughout a person's life (Spielman et al., 2020). Also, individuals with diagnosed cases of ADHD frequently have at least one co-occurring learning disability (Spielman et al., 2020). This is true in my life as my ADHD causes me to be distracted when I am trying to do work. It makes living with dyslexia and auditory processing disorder more difficult. For example, when people are talking in class, I immediately turn to the person speaking even if it has nothing to do with what I am interested in or what I need to be working on. I already struggle with working at a normal pace so when the world around me seems to be shouting it is difficult to remain calm. All the talking or any kind of noise or even my own random thoughts can make it difficult to determine what to do next. To manage, I make sticky notes of everything I need to do for the week, so I do not lose track of my assignments. Another way I cope with feeling disoriented by my ADHD is to listen to music. This gives me something to focus on and helps calm the chaos of all my thoughts rattling.

Prior to gaining a deeper understanding of learning disabilities, I believed that my way of processing information was simply how everyone thought, and I accepted the repeated advice that I needed to work harder. After studying this topic, I now understand my learning disabilities and know there are different strategies to accomplish the same goals. People with learning disabilities can become highly successful even though it is not a traditional way of thinking. My career goal is tobecome a Child Life Specialist. This means I will need to communicate efficiently with children and understand their needs. I will also need to understand and communicate with their parents. It is very likely that some of these children will also have learning disabilities. Now that I know about different learning disabilities and disorders, I will be more patient and better equipped to help those children.

It can be difficult for teachers and other adults to understand learning disabilities. Children with learning disabilities are not unintelligent, and they are not unmotivated. Instead, children with learning disabilities require content to be presented differently, in a way that aligns with how they process the information. There are many children and adults who must deal with learning disabilities, and it would be good for everyone in the public to be aware of how these disabilities impact learning and communication. If more people understand that everyone has a unique mind including those with learning disabilities, then we can become more open to new ways of thinking about how others learn and succeed.

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You Snooze, You Lose? A Comparative Analysis Leveraging Hypnagogia and Lucid Dreaming for Creativity Through Executive Control and Associative Processing

Research Paper by
LUCIA NARANJO COPESTAKE

HONRH 2033: SPECIAL TOPICS IN HONORS

When Lucia Naranjo Copestake approached me for an Honors Independent Research Project, her initial ideas focused on researching ways to capitalize on one's sleeping life to harness creativity and productivity. This led Lucia and me down a rabbit hole of research questions and search terms, where theory became research, and research became praxis. The result was not merely a "book report" or a meta-analysis, but rather a discovery of new frontiers in sleep, semi-lucidity, and consciousness. Through the research process, conclusions, and future directions, she discovered and offers that hitting the snooze button, in moderation, might not be a vice but rather a smart solution to unlock the hypnopompic state for creative problem-solving without the risks of lucidity-seeking behaviors or possible sleep loss associated with hypnagogic states. Challenging previous assumptions and begging the question posed in her title: You Snooze, You Lose?

- Michael Devoley

Abstract

Creativity is often conceptualized as a stable trait; however, emerging evidence suggests it is better understood as a dynamic process shaped by fluctuating cognitive states. This paper examines how creativity arises across altered states of consciousness, specifically hypnagogia and lucid dreaming, and proposes a cross-state framework in which creative cognition depends on shifts in the balance between associative and executive processes. Drawing on cognitive neuroscience and sleep research, hypnagogia is characterized as a low-control state that facilitates expanded associative processing and increased likelihood of insight through reduced executive constraint. In contrast, lucid dreaming involves partial reactivation of executive and metacognitive networks, enabling intentional manipulation, evaluation, and stabilization of internally generated content within a dream environment. While hypnagogia appears to support the generative phase of creativity through increased semantic flexibility, lucid dreaming may contribute to evaluative and refinement processes through increased cognitive control. Integrating findings from studies on semantic memory, default mode and executive network interactions, and sleep-state cognition, this paper proposes that creativity emerges from the interaction of these states across time rather than from any single optimal condition. A cross-state model is introduced in which hypnagogic, lucid, hypnopompic, and waking cognition form a temporally extended system for the generation, transformation, and consolidation of ideas. This framework challenges trait-based accounts of creativity and highlights the importance of state-dependent and transitional dynamics in creative cognition.

Keywords: hypnagogia, creativity, lucid dreaming, hypnopompia, N1 sleep, altered states, sleep onset, executive function, semantic flexibility, Default Mode Network (DMN), Executive Control Network (ECN)

Introduction

Creativity is rarely experienced as a constant mental ability. Ideas often emerge unpredictably, appearing more easily in some moments than in others, particularly during unusual states of awareness in which thought becomes less constrained by ordinary patterns of attention and control. Experiences occurring in transitional states of sleep are especially valuable in this regard. Throughout history, artists, writers, and scientists have described vivid images, unexpected associations, and moments of insight arising during these moments between waking consciousness and sleep, suggesting that creative cognition may depend partly on the shifts in conscious state, rather than solely on stable individual traits.

Recent research in cognitive neuroscience and sleep science has begun to support this possibility by showing that altered states of consciousness modify the interaction between associative and executive processes involved in creative thinking. Dream-related states are particularly relevant because they combine internally generated imagery with changes in attention, self-awareness, and cognitive control. Within this domain, different stages of the sleep-wake boundary offer distinct cognitive conditions that may shape creative processes in different ways. Two states illustrating this contrast are hypnagogia and lucid dreaming. Hypnagogia, the transitional phase between wakefulness and sleep, is characterized by fleeting, often involuntary imagery and a reduction in executive control. In contrast, lucid dreaming involves awareness of the dream state itself, allowing for varying degrees of reflection and intentional influence within an immersive dream environment. These differences suggest that each state may support creativity through distinct mechanisms, rather than one serving as a uniformly superior condition.

With an aim to achieve an optimal state of creativity, this study examines hypnagogia and lucid dreaming as complementary cognitive environments, comparing the thought processes they facilitate to explore how creative potential emerges from the interaction of spontaneous and controlled mental processes. Rather than asking which state is better for creativity, the central argument is that creativity depends on the dynamic interplay between these states across time. This paper proposes a cross-state framework in which hypnagogic, lucid, hypnopompic, and waking cognition form a temporally extended system in which ideas are generated under low executive constraint, then carried forward, shaped, and stabilized as control progressively returns. This reframes creativity from an inherent trait to a process distributed across shifting cognitive states, positioning the sleep-wake boundary as a structurally significant, underexplored, zone of creative cognition.

Critical Literature Review

Creativity and Altered States

Creativity is commonly defined as the ability to generate novel and useful ideas (Beaty et al., 2016); however, the current paper frames it as the connection between remotely related concepts (Herault et al., 2024), emphasizing semantic flexibility and greater associative distance. This framing is preferred because it maps more directly onto the cognitive mechanisms being analyzed, rather than just requiring a judgement about usefulness, which is context-dependent and difficult to operationalize. High-creativity individuals are shown to have more flexible semantic memory networks, produce more uncommon associations, and, as a consequence, perceive distant concepts as related (Herault et al., 2024). Semantic flexibility can be operationalized using semantic network analyses, allowing approximate measurement of associative breadth (Beaty & Johnson, 2021). The creative process involves semantic flexibility and the ability to traverse greater associative distance, reflecting an expansion of associative space in which a broader network of conceptual links is activated. This emphasizes generative processes, yet evaluation and refinement remain critical components of creativity often underexamined in these frameworks (Press et al., 2020).

Creativity is not a single process, it emerges from the interaction between multiple brain networks. On one hand, the default mode network (DMN), focusing on idea generation and memory retrieval, and on the other hand, the executive control network (ECN), functioning for evaluation, constraint, and goal-directed thinking (Beaty et al., 2016). The interaction is dynamic, not static. This aligns with broader frameworks of spontaneous and controlled cognition, where internally generated thought interacts with deliberate constraint to shape creative output (Press et al., 2020). Together, these systems support the view of creativity as a synergy between spontaneous and controlled cognition. While associative processes generate possibilities, executive processes filter, select, and refine them. This interaction posits creativity as process-based rather than simply an outcome, and dependent on coordination between systems rather than extremes.

Creativity is difficult to measure objectively. Traditional approaches, such as divergent thinking tasks assess fluency, originality, and flexibility. More recent approaches conceptualize creativity in terms of semantic distance, where creativity is operationalized as the distance between concepts, such that the connection of less related ideas are considered more creative (Beaty & Johnson, 2021). Semantic network approaches provide a more precise measurement of associative structure, capturing how individuals navigate conceptual space rather than simply how many ideas they produce. Neural correlates (Herault et al., 2024) further demonstrate how semantic distance is associated with patterns of brain activation, linking behavioral measures of creativity to underlying cognitive mechanisms. However, these approaches still primarily capture outcomes of creative cognition rather than the processes that generate them.

Trait bias is prominent in the literature as creativity is often treated as a stable individual difference, overlooking within-person variation across cognitive states. While the dual-process model posits that creativity emerges from a balance between associative and executive processes, it does not fully account for how this balance may shift under different conditions (Press et al., 2020). In particular, existing work does not sufficiently examine what occurs when one process dominates or when this balance is disrupted. Moreover, measures such as semantic distance and divergent thinking capture the outcomes of creative cognition but do not explain how different states, including sleep-related states, alter the underlying cognitive processes. Emerging experimental approaches begin to address this limitation by directly manipulating cognitive states, rather than inferring them from performance alone. Targeted Dream Incubation (TDI) methods such as Dormio, a technique that enables individuals to guide their dreams toward particular themes with the aim of boosting creativity or strengthening memory consolidation (Haar Horowitz et al., 2020) and remote dream incubation, in which prompts or cues are delivered to individuals during sleep from an external source to influence dream content (Bellaiche et al., 2024) provide experimental leverage to study these state-dependent effects. These developments suggest that creativity may be better understood as a state-dependent phenomenon, shaped by how spontaneous and controlled processes are configured at a given moment, rather than as a fixed trait.

Sleep Onset States

Hypnagogia is the sleep onset (N1) state between wakefulness and sleep. It is a hybrid state, characterized by reduced external awareness alongside partial preservation of awareness of internal content, making it neither fully conscious, nor fully unconscious. It features spontaneous imagery, fragmented thought, and associative processing, reflecting diminished executive control, while retaining fragile meta-awareness (Ghibellini & Meier, 2023). Existing literature tends to emphasize phenomenology, focusing on imagery and hallucinations, rather than specifying the underlying cognitive mechanisms. This paper reframes hypnagogia in process terms, particularly through the contrast between executive control and associative processing.

Creativity appears to peak within a narrow cognitive window rather than across sleep more broadly. As one of the few studies focusing on hypnagogia's relationship to creativity with relatively large samples, Lacaux et al. (2021) found that entering N1 for as little as 15 seconds tripled the probability of insight, with the effect disappearing if participants remained fully awake or transitioned into deeper sleep. The study operationalizes creativity strictly as insight problem solving, highlighting state-dependent facilitation of specific creative processes rather than general creative ability. However this also does not directly assess associative breadth or semantic distance, relying instead on behavioral outcomes.

Hypnagogia is characterized by reduced top-down constraint, allowing for integration of memory fragments and the formation of conceptually distant or non-linear associations (Haar Horowitz et al., 2020). This pattern reflects an expansion of associative space, involving broader activation across semantic networks, and reduced constraint on idea generation. However, much of the literature infers associative richness indirectly from subjective reports or task performance, rather than measuring associative structure itself, in contrast to approaches such as semantic distance metrics. During sleep-onset, logical monitoring weakens, yet individuals can still report thoughts when awakened, indicating low executive constraint coexists with fragile, partial meta-awareness (Haar Horowitz et al., 2020). While this state is often described as a loss of control, such characterization may be misleading; rather than a complete absence, it reflects a relaxation of control processes, allowing associative activity to proceed with fewer constraints (Beaty et al., 2016).

Haar Horowitz et al. (2023) further demonstrate that hypnagogic content can be externally biased through targeted prompts, leading to increased post-sleep creative performance. This finding challenges the notion that hypnagogia is purely spontaneous, instead suggesting that it is at least partially steerable in the absence of full executive control. This distinction is important for interpreting the low-control nature of hypnagogia. Rather than reflecting a uniform absence of regulatory capacity, the evidence points to a more selective relaxation of control processes. Executive filtering appears reduced to the extent that associative activity can proceed more broadly and with less centralized constraint, while still remaining sensitive to incoming signals, whether internally generated memory fragments or externally introduced prompts. Taken together, this implies that hypnagogic cognition is not simply passive or chaotic. Instead, it may operate in a regime in which the threshold for activation across semantic networks is lowered, increasing responsiveness to weak associative signals that would typically be suppressed under stronger executive prioritization.

A related but distinct transitional state, hypnopompia, occurs at the opposite end of the sleep cycle during the emergence from sleep into wakefulness. Despite its structural symmetry with hypnagogia, it has received substantially less empirical attention, and its cognitive profile remains largely uncharacterized. Preliminary evidence suggests that awakening involves a staged reactivation of executive systems, with prefrontal regions lagging behind the return of basic awareness, which would produce a transitional window with properties broadly similar to hypnagogia but in a different direction of cognitive change. Whether this directional difference matters for associative processing and creativity remains an open question, one this paper returns to in its discussion of future research.

Across these studies, creativity is primarily measured through insight tasks (Lacaux et al., 2021) or post-sleep performance outcomes (Haar Horowitz et al., 2023). What remains underexplored are direct measures of semantic distance, associative network structure, and how state-dependent shifts in executive control influence the generation versus evaluation of ideas. In response, this paper conceptualizes hypnagogia not simply as a creative state, but as a cognitive configuration defined by reduced executive control, expanded association, and heightened sensitivity to external prompts. This framework provides a more precise comparison with other states of consciousness, by situating hypnagogia along the continuum of spontaneous-to-controlled cognition.

Lucid dreaming and metacognitive control

Lucid dreaming is the state of being aware of dreaming during REM sleep. During this process, there is coexistence of dream imagery, reflective awareness, and volitional control. It is described as a hybrid state with features of both waking and REM sleep (Voss et al., 2009), where there is restored or elevated executive control within a dream context. Baird et al. (2019) provide a recent overview of the cognitive neuroscience of lucid dreaming, emphasizing the reactivation of prefrontal networks and metacognitive monitoring during lucidity. Rather than framing lucidity merely as hybrid consciousness, this paper conceptualizes it specifically in terms of executive control and metacognition, as with hypnagogia, situating it along a continuum of controlled versus spontaneous cognition.

Self-reflection, thought monitoring, and volitional control are characteristics associated with increased activation in prefrontal regions (BA9/10), compared to non-lucid REM, in which executive functions are diminished (Baird et al., 2019). This pattern indicates that lucidity involves partial reactivation of executive functions rather than complete restoration of waking control. The evidence points to selective reactivation rather than complete executive functioning, creating conditions for altered, but not fully regulated, cognition.

Dream content remains bizarre, associative, and internally generated, yet increased control induces goal-directed thinking and intentional manipulation of content (Baird et al., 2019). This indicates that associative processing is present but constrained, relative to non-lucid REM. Compared to states of reduced control, such as hypnagogia, associative space may be narrower, as spontaneous mind-wandering is reduced and executive control imposes structure. The common assumption that dream bizarreness reflects associative richness is insufficient, as it does not account for how top-down control and higher-level cognitive processes may reshape or limit associative exploration. Lucid dreaming allows for intentional actions within the dream, including the practice of learned tasks. Erlacher & Schredl (2010) found that practicing motor tasks in lucid dreams improves subsequent waking performance, supporting the idea that lucidity functions as a simulated yet controlled cognitive environment. Still, such evidence supports goal-directed cognition and rehearsal effects, rather than creativity. Performance improvements indicate the strengthening of existing representations, not the generation of novel or distantly associated ideas.

The tension between these two bodies of literature points to a structural gap in current research. Creativity studies have not incorporated lucid dreaming as an experimental condition, while lucid dreaming research has not adopted creativity measures such as semantic distance or associative breadth as primary outcomes. As a result, the relationship between lucidity and creative cognition remains empirically uncharacterized. The dearth of studies directly linking lucid dreaming to creativity outcomes means the existing evidence can only establish that lucid dreaming produces a cognitive profile distinct from both wakefulness and non-lucid REM sleep, defined by partial executive reactivation, metacognitive awareness, and goal-directed processing within an internally generated dream environment. Whether and how this profile intersects with creative cognition is a question the current literature cannot yet answer, and one this paper takes up in the analysis that follows.

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Ethics: The Case of David Reimer

Essay by KALIA TODD

PSYC 2301: GENERAL PSYCHOLOGY

Kalia Todd's paper critiques John Money's controversial experiment, arguing that it was profoundly unethical on multiple grounds. Ms. Todd examines the absence of informed consent, the significant psychological harm inflicted, and the effects of experimenter bias. Through this case, she highlights the importance of ethical standards in psychological research and advocates a more cautious, patient-centered approach. In addition to an ethical critique, Ms. Todd's paper incorporates psychological concepts such as informed consent, experimenter bias, case studies, and control groups, using the well-documented Reimer case to connect theoretical principles. The paper is thoughtfully organized, progressing from psychological definitions to an analysis of consent, a discussion of harm, and a reflective conclusion that integrates her insights and considerations.

- Marla Moreno-Jordan

Introduction

On August 22, 1965, a pair of identical twin boys were born to parents, Ron and Janet Reimer. One was named Bruce and the other, Brian. On April 27, 1966, the boys went in for circumcision in order to correct phimosis (a problem with urination) that both boys had. Instead of performing the "routine" circumcision with normal surgical tools for the procedure, Bruce Reimer's physician used cauterization, a technique to burn skin tissue. The result was irreparable damage to Bruce Reimer's penis. Brian Reimer did not undergo his circumcision. A year later, in 1967, Ron and Janet Reimer requested the help of John Money (a well-known sexologist and psychologist who researched intersex children and gender identity). Money advised that they raise Bruce as a girl, and thus, Bruce underwent surgery to remove his penis and testes and construct basic female genitals. After the sex reassignment surgery, Bruce (now named Brenda), was given estrogen and continued to see John Money with his brother Brian (who was not told that Brenda used to be Bruce despite the surgery, hormones, and dressing like a female, Bruce experienced gender dysphoria and bullying at school. In 1980, Ron Reimer told his son the truth about what had happened when he was older. Subsequently, Bruce Reimer, reassumed his male identity and changed his name to David (the name this paper will use from here on). He began taking testosterone and had other surgeries to construct a penis and remove his breasts. Unfortunately, David's life was anything but normal in the years following his revelation. While he spoke out about what had happened in his childhood, it is safe to say he never recovered and was severely depressed. Life events (including his brother's suicide and his wife's filing for divorce) contributed to his suicide in 2004 (Gaetano et al., 2015). This paper will attempt to dissect and discuss the ethics of the David Reimer case, specifically the actions of John Money.

What Is Ethics?

Psychology is defined as the "scientific study of the mind and behavior" (Spielman et al., 2020). David Reimer's case certainly falls under psychology as John Money studied the effects of raising a biological male as a female, asking two fundamental questions:

1. Does this child's mind work like a female? (mind)
2. Does this child act like a female? (behavior)

According to Money, if these two questions were a resounding yes, then that child was female by *social construct*.

However, to analyze John Money and his experiment, one must explore ethics. Ethics is generally defined as "a set of moral principles" and "the principles of conduct governing an individual or a group" (Merriam-Webster, 2025). However, in psychology, ethics becomes a strictly regulated process that experiments must pass through. The multifaceted parts of ethics include (but is not limited to) the following:

1. Informed consent, which is the "process of informing a research participant about what to expect during an experiment, any risks involved, and the implications of the research, and then obtaining the person's consent to participate" (Spielman et al., 2020).
2. Strict guidelines that "ensure that the experiment does not result in harm" (Spielman et al., 2020).

While there are many parts of the David Reimer experiment that were unethical, this paper will focus on proving that the experiment was unethical by the two dilemmas; (1) there was no process of informed consent specifically with David Reimer, the sole participant; and (2) the experiment did, in fact, cause harm.

Informed Consent

David Reimer's experiment was a case or clinical study, which is distinguished from others because of its emphasis on "one person or just a few individuals" (Speilman et al., 2020). In this paper, the case focused on one person, David Reimer. However, it is interesting to note that this case study would've been increasingly appealing to Dr. Money because of the presence of a control group which "serves as a basis for comparison and controls for chance factors that might influence the results of the study" (Spielman et al., 2020). The control group in this case was Brian Reimer, David's identical twin brother. For Money, this was the perfect control group. Two people that share the same genetic makeup and biological gender, except one was reassigned a new sex and one remained the same biological gender.

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VISUAL COMMUNICATION AND OTHER ONLINE SECTIONS

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